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National Space Science Data Center/
World Data Center A For Rockets and Satellites

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Report on Active and Planned Spacecraft and Experiments

August 1981



REPORT ON ACTIVE AND PLANNED
SPACECRAFT AND EXPERIMENTS

Edited by

Robert W. Vostreys

Harriet H. Malitson

National Space Science Data Center

August 1981

National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

PREFACE

The *Report on Active and Planned Spacecraft and Experiments* provides the professional community with information on current as well as planned spacecraft activity in a broad range of scientific disciplines. All spacecraft that were active at some time during the period June 1, 1980, to May 31, 1981, are included. The performance information for active NASA and NASA-cooperative programs is based, to a large extent, on the project office status reports through May 31, 1981. In addition, The National Space Science Data Center (NSSDC) has made use of information from other sources. Therefore, new data concerning certain spacecraft that were launched after May 31, but before this report went to press, have been included to reflect the latest status. We do not claim our coverage to be complete for this period, but have simply used all available data to make this report as accurate and up-to-date as possible.

We would like to acknowledge the cooperation of the staff at NSSDC in obtaining information and offering suggestions for this report. The cooperation of the project offices and experimenters in supplying current documentation of their spacecraft and experiments is gratefully acknowledged. We are particularly pleased with the many constructive comments and corrections we have received from interested users of this report.

Robert W. Vostreys
Harriet H. Malitson

August 1981

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TABLE OF CONTENTS

	<u>Page</u>
PREFACE	iii
1. INTRODUCTION	3
1.1 Purpose	3
1.2 Contents	3
1.3 Organization	3
1.4 Document Availability	4
1.5 Request for Additions/Corrections	4
2. DESCRIPTIONS OF ACTIVE SPACECRAFT AND EXPERIMENTS	9
2.1 Contents of Spacecraft Entries	9
2.2 Contents of Experiment Entries	9
2.3 Active Spacecraft and Experiment Descriptions*	10
3. DESCRIPTIONS OF PLANNED SPACECRAFT AND EXPERIMENTS	99
3.1 Contents of Spacecraft Entries	99
3.2 Contents of Experiment Entries	99
3.3 Planned Spacecraft and Experiment Descriptions*	100
4. INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS	175
5. INVESTIGATOR NAME INDEX	199
APPENDIX A - OTHER RELEVANT SPACECRAFT	A-1
APPENDIX B - SPECIAL INVESTIGATORS	B-1
B1. Joint IRAS Science Working Group	B-3
B2. The Caravane Collaboration (COS-B)	B-4
B3. Individual Galileo Investigations	B-6
B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release Module (IRM) Scientific Team	B-13
B5. Copernicus Guest Investigators and Investigations	B-14
B6. International Solar Polar Mission (ISPM) Theoretical and Interdisciplinary Scientists	B-17
B7. NASA-Selected Magsat Investigators	B-18
B8. Synthetic Aperture Radar (SAR) Investigators on Venus Orbiting Imaging Radar (VOIR)	B-26
B9. NASA-Selected Earth Radiation Budget Experiment (ERBE) Investigators	B-28
APPENDIX C - DEFINITIONS	C-1
APPENDIX D - ABBREVIATIONS AND ACRONYMS	D-1

*For a complete listing of the spacecraft and experiments described in these sections, please refer to the Index of Active and Planned Spacecraft and Experiments (Section 4).

1

INTRODUCTION

1. INTRODUCTION

1.1 Purpose

This report provides the professional community with information on current and planned spacecraft activity for a broad range of scientific disciplines. By providing a brief description of each spacecraft and experiment as well as its current status, it is hoped that this document will be useful to many people interested in the scientific, applied, and operational uses of data collected. Furthermore, for those planning or coordinating future observational programs employing a number of different techniques such as rockets, balloons, aircraft, ships, and buoys, this document can provide some insight into the contributions that may be provided by orbiting instruments.

1.2 Contents

This document includes information concerning active and planned spacecraft and experiments known to the National Space Science Data Center. The information covers a wide range of disciplines: astronomy, earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represent the efforts and funding of individual countries as well as cooperative arrangements among different countries.

Descriptions of navigational and communications satellites are specifically not included here. Also not given are descriptions of spacecraft that contain only continuous radio beacons used for ionospheric studies. Many of these spacecraft are listed in the *SPACEWARN Bulletin**. No attempt has been made to present information regarding classified spacecraft or experiments.

1.3 Organization

This report is divided into two major parts with descriptive material introducing each section.

The first part of this report, Section 2 - "Descriptions of Active Spacecraft and Experiments," is a listing of descriptions of all spacecraft and experiments that were active at some time during the period June 1, 1980, to May 31, 1981. In addition, new data concerning certain spacecraft that were launched or changed status after May 31, but before this report went to press,

*The *SPACEWARN Bulletin* is prepared by the World Data Center A for Rockets and Satellites, Code 601, Goddard Space Flight Center, Greenbelt, MD 20771, USA. It is intended to serve as an international communications mechanism for the rapid distribution of information on satellites and space probes. It is published on behalf of the Committee on Space Research (COSPAR) by the International URSIGRAM and World Days Service (IUWDS), a permanent service of the International Scientific Radio Union in association with the International Astronomical Union and the International Union for Geodesy and Geophysics.

have been included to reflect the latest status. The listing is arranged by spacecraft common name and the last name of the principal investigator or team leader.

The second part, Section 3 - "Descriptions of Planned Spacecraft and Experiments," contains descriptions of the spacecraft and experiments that were planned or approved missions as of May 31, 1981, for which experiments or investigations have been selected and NSSDC has at least minimal documentation.

Sections 4 and 5 are indexes to the information presented in Sections 2 and 3. Section 4, "Index of Active and Planned Spacecraft and Experiments," is an alphabetical listing by spacecraft name, including both common and alternate names, of all active and planned spacecraft and experiments. This listing serves as an index to the location of spacecraft and experiment descriptions and includes launch dates and current status-of-operation data. Section 5, "Investigator Name Index," is a listing, ordered by last name, of the investigators or team members associated with the experiments and their current affiliations.

These major sections were generated from NSSDC automated files. Other relevant spacecraft without brief descriptions are given in Appendix A. Special investigators for some missions that could not be presented conveniently in Section 2 or 3 appear in Appendix B. Certain words and phrases used in this report are defined in Appendix C. Appendix D is a comprehensive list of the abbreviations and acronyms used in this document.

1.4 Document Availability

Upon request, NSSDC will provide copies of this report and future supplements to individuals or organizations resident in the United States who can establish a need (in writing or by telephone) for this information. The same services are available to persons outside the United States through the World Data Center A for Rockets and Satellites (WDC-A-R&S). The official addresses for requests are printed on the inside front cover.

Recipients are requested to inform potential users of the availability of this report. Because of continuing costs involved in publishing a document of this size on a periodic basis, NSSDC encourages individuals located at the same organization to share this document.

1.5 Request for Additions/Corrections

NSSDC continually strives to increase the usefulness of this report by improving the spacecraft and experiment descriptions and by including additional spacecraft and experiments as they become known to NSSDC. This report is complete and reasonably accurate concerning NASA and NASA-cooperative programs; however, descriptions of other spacecraft and experiments may be incomplete because of a lack of information available to NSSDC. It should be noted that the information concerning the planned spacecraft and experiments is frequently general in nature and subject to change.

NSSDC would welcome comments as to errors or omissions in this report. Recommendations regarding the overall contents and organization also would be appreciated. In particular, it is hoped that principal experimenters and project offices will cooperate in bringing such matters to NSSDC's attention.

2

**DESCRIPTIONS OF ACTIVE SPACECRAFT
AND EXPERIMENTS**

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2. DESCRIPTIONS OF ACTIVE SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments pertinent to this report that were active at some time during the period June 1, 1980, to May 31, 1981. In addition, new data concerning spacecraft or experiments that were launched or changed status after May 31, but before this report went to press, have been included to reflect the latest status. The descriptions are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. Explorer spacecraft prelaunch generic names are used as common names; e.g., IMP-J instead of Explorer 50. If the common name, as used by NSSDC, is not known, the reader should refer to his own common name in the Index of Active and Planned Spacecraft and Experiments (Section 4) to obtain the cross reference to the NSSDC common name.

Each spacecraft or experiment entry in this section is composed of two parts, a heading and a brief description. The headings list characteristics of spacecraft and experiments. Many of the terms used in this section are defined in Appendix C.

2.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of initial orbit parameters: orbit type, epoch date, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, or probe missions. In addition, the heading contains the spacecraft weight, launch date, site, vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel codes as follows:

CODE CO (general contact)
CODE MG (program manager)
CODE MM (mission manager)
CODE MO (mission operations manager)
CODE MS (mission scientist)
CODE PC (project coordinator)
CODE PD (project director)
CODE PE (project engineer)
CODE PM (project manager)
CODE PS (project scientist)
CODE SC (program scientist)
CODE TD (technical director)

This terminology is standard for NASA missions; the equivalent functions for the missions of other countries or agencies have been given the same position names. The spacecraft brief description is immediately below each heading.

2.2 Contents of Experiment Entries

Each experiment entry heading includes the experiment name, the NSSDC ID code, the investigative program, the investigation discipline, and the name

and affiliation or location of the principal investigator (PI) or team leader (TL) for the experiment as well as other investigators (OI), team members (TM), deputy team leader (DT), co-investigator (CI), experiment manager (EM), experiment scientist (ES), or general contact (CO) associated with the experiment. The investigators are not listed in any particular order within each experiment. The experiment brief description is immediately below each heading.

The investigative program may include one of the following NASA Headquarters division codes:

CODE EB (Environmental Observations)
CODE EC (Communications)
CODE EM (Space Processing)
CODE ER (Resource Observations)
CODE RS (Space Systems)
CODE SB (Life Sciences)
CODE SC (Astrophysics)
CODE SL (Planetary)
CODE ST (Solar Terrestrial)

The addition of /CO-OP to any code indicates a cooperative effort between NASA and another agency.

2.3 Active Spacecraft and Experiment Descriptions

A spacecraft is included in the active section of this report if it had a status of "normal" or "partial" and a data acquisition rate of "standard" or "substandard" for any length of time since June 1, 1980. Experiments that meet these same criteria also are included.

Active spacecraft with only passive experiments such as laser reflectors or those used only in upper atmospheric drag observations are included in Appendix A.

***** 1976-059A*****

SPACECRAFT COMMON NAME- 1976-059A
ALTERNATE NAMES- 08916, USAF OPERATIONAL SAT-76
NSSDC ID- 76-059A

LAUNCH DATE- 06/26/76 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAf

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/28/76
ORBIT PERIOD- 1436. MIN INCLINATION- 0. DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - SPACE DIVISION USAF-LAS
PS - W.D. EVANS LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION-CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED U.S. AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

----- 1976-059A, HIGHIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR
NSSDC ID- 76-059A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGHIE LOS ALAMOS NAT LAB
OI - R.D. DELIAN LOS ALAMOS NAT LAB
OI - D.N. BAKER LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA-PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG HALF-ANGLE COLLIMATOR (HAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG HAC; FLURES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5-DEG HAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 50 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG HAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 150 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS RANGING FROM 1.2 TO 600 MEV.

***** 1977-007A*****

SPACECRAFT COMMON NAME- 1977-007A
ALTERNATE NAMES- 09005, USAF OPERATIONAL SAT-77
NSSDC ID- 77-007A

LAUNCH DATE- 02/06/77 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAf

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/08/77
ORBIT PERIOD- 1436. MIN INCLINATION- 0. DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - SPACE DIVISION USAF-LAS
PS - W.D. EVANS LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION-CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED U.S. AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

----- 1977-007A, HIGHIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR
NSSDC ID- 77-007A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGHIE LOS ALAMOS NAT LAB
OI - R.D. DELIAN LOS ALAMOS NAT LAB
OI - D.N. BAKER LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA-PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG HALF-ANGLE COLLIMATOR (HAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG HAC; FLURES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5-DEG HAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 50 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG HAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 150 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS RANGING FROM 1.2 TO 600 MEV.

***** 1979-053A*****

SPACECRAFT COMMON NAME- 1979-053A
ALTERNATE NAMES- 11597, USAF OPERATIONAL SAT-79
NSSDC ID- 79-053A

LAUNCH DATE- 06/19/79 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAf

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/11/79
ORBIT PERIOD- 1436.5 MIN INCLINATION- 1.4 DEG
PERIAPSIS- 35729. KM ALT APOAPSIS- 35859. KM ALT

PERSONNEL
PM - SPACE DIVISION USAF-LAS
PS - W.D. EVANS LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION-CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED U.S. AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

----- 1979-053A, HIGHIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR
NSSDC ID- 79-053A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGHIE LOS ALAMOS NAT LAB
OI - R.D. DELIAN LOS ALAMOS NAT LAB
OI - D.N. BAKER LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA-PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG HALF-ANGLE COLLIMATOR (HAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG HAC; FLURES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5-DEG HAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 50 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG HAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 150 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS

ORIGINAL PAGE IS
OF POOR QUALITY

RANGING FROM 1.2 TO 600 MEV. THIS INSTRUMENT DIFFERED FROM PREVIOUS INSTRUMENTS IN THAT IT HAD A FAST-TIME MODE FOR ELECTRONS.

***** 1981-025A*****

SPACECRAFT COMMON NAME- 1981-025A
ALTERNATE NAMES- 12339

NSSDC ID- 81-025A

LAUNCH DATE- 03/16/81 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USA/

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 03/17/81
ORBIT PERIOD- 1421.2 MIN INCLINATION- 1.9 DEG
PERIAPSIS- 39463. KM ALT APOAPSIS- 39927. KM ALT

PERSONNEL
PM - SPACE DIVISION USAF-LAS
PS - W.D. EVANS LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION-CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIAL VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED U.S. AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

----- 1981-025A, HIGH-1-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR

NSSDC ID- 81-025A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - P.R. MIGNIE LOS ALAMOS NA LAB
OI - W.D. BELIAN LOS ALAMOS NAT LAB
OI - D.W. BAKER LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE ENERGETIC-PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA-PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG HALF-ANGLE COLLIMATOR (MAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG MAC; FLUXES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5-DEG MAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 90 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG MAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 100 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS RANGING FROM 1.2 TO 600 MEV. THIS INSTRUMENT HAD A FAST-TIME MODE FOR ELECTRONS.

***** AE-E*****

SPACECRAFT COMMON NAME- AE-E
ALTERNATE NAMES- 3 6E, ATMOSPHERE EXPLORER-E
EXPLORER 55, AE 5

NSSDC ID- 75-107A

LAUNCH DATE- 11/28/75 WEIGHT- 735. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/29/75
ORBIT PERIOD- 117.29 MIN INCLINATION- 19.7 DEG
PERIAPSIS- 156. KM ALT APOAPSIS- 2963. KM ALT

PERSONNEL
MG - M.W. CHISWOLD NASA HEADQUARTERS
SC - E.A. SCHNEBLING NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - M.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE AE-E MISSION WAS TO INVESTIGATE THE CHEMICAL PROCESSES AND ENERGY TRANSFER MECHANISMS THAT CONTROL THE STRUCTURE AND BEHAVIOR OF THE EARTH'S ATMOSPHERE AND IONOSPHERE IN THE REGION OF HIGH ABSORPTION OF SOLAR ENERGY AT LOW AND EQUATORIAL LATITUDES. THE SIMULTANEOUS SAMPLING AT HIGHER LATITUDES WAS CARRIED OUT BY THE AE-D SPACECRAFT UNTIL ITS FAILURE ON 1/29/76 AND THEN BY AE-C. UNTIL IT REENTERED ON 12/12/76. THE SAME TYPE OF SPACECRAFT AS AE-C WAS USED, AND THE PAYLOAD CONSISTED OF THE SAME TYPES OF INSTRUMENTS EXCEPT THAT THE LOW-ENERGY ELECTRON AND UV METRIC OXIDE EXPERIMENTS WERE DELETED AND A BACKSCATTER UV SPECTROMETER WAS ADDED TO MONITOR THE OZONE CONTENT OF THE ATMOSPHERE. THE TWO EXPERIMENTS THAT WERE DELETED WERE MORE APPROPRIATE FOR THE HIGH-LATITUDE REGIONS. THE PERIGEE SWEEP THROUGH MORE THAN SIX FULL LATITUDE CYCLES AND TWO LOCAL TIME CYCLES DURING THE FIRST YEAR AFTER LAUNCH WHEN THE ORBIT WAS ELLIPTICAL AND THE PERIGEE HEIGHT WAS VARIED BETWEEN 150 AND 400 KM. THE CIRCULARIZATION OF THE ORBIT AROUND 390 KM WAS MADE ON 11/29/76 AND THE SPACECRAFT WAS RAISED TO THIS HEIGHT WHENEVER IT WOULD DECAY TO ABOUT 250 KM. AE-E DECAYED ON JUNE 10, 1981. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 263-266, APRIL 1973.

----- AE-E, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE (CEP)

NSSDC ID- 75-107A-01 INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

PERSONNEL
PI - L.M. BRACE NASA-GSFC
OI - R.P. THEIS NASA-GSFC
OI - A. DALGAMNO SAO

BRIEF DESCRIPTION

THE CEP CONSISTED OF TWO IDENTICAL INSTRUMENTS DESIGNED TO MEASURE ELECTRON TEMPERATURES, ELECTRON AND ION CONCENTRATIONS, ION MASS, AND SPACECRAFT POTENTIAL. ONE PROBE WAS ORIENTED ALONG THE SPIN AXIS OF THE SPACECRAFT (USUALLY PERPENDICULAR TO THE ORBIT PLANE), AND THE OTHER RADIALLY, SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING-POTENTIAL, LANGMUIR-PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIRST ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED 1-5 TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 1,014 DEG K (10-PERCENT ACCURACY); ION DENSITY BETWEEN 1.014 AND 1.017 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 1.016 PER CUBIC CM; AND ION MASS AT ION DENSITIES ABOVE 1.014 PER CUBIC CM. EACH PROBE HAD A CYLINDRICAL GUARD RING, THE 2.5-CM-LONG GUARD RING WAS AT THE END OF A 25-CM BOOM, AND THE COLLECTOR EXTENDED ANOTHER 7.5 CM BEYOND THE GUARD RING. THE BOOM, GUARD, AND COLLECTOR WERE 0.2 CM IN DIAM. MORE DETAILED INFORMATION CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 341-348, APRIL 1973.

----- AE-E, BRINTON-----

INVESTIGATION NAME- BENNETT ION-MASS SPECTROMETER (BIMS)

NSSDC ID- 75-107A-10 INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M.C. BRINTON NASA-GSFC
OI - M.W. PHARO, III NASA-GSFC
OI - M.A. TAYLOR, JR. NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE, THROUGHOUT THE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE 1 TO 72 ATOMIC MASS UNITS (U) AND IN THE AMBIENT DENSITY RANGE FROM 5 IONS PER CUBIC CM TO 5,000 IONS PER CUBIC CM EACH. THE MASS RANGE WAS NORMALLY SCANNED IN 1.6 S, BUT THE SCAN TIME PER RANGE COULD BE INCREASED BY COMMAND. LABORATORY AND IN-FLIGHT DETERMINATION OF SPECTROMETER EFFICIENCY AND MASS DISCRIMINATION PERMITTED DIRECT CONVERSION OF MEASURED ION CURRENTS TO AMBIENT CONCENTRATIONS. CORRELATION OF THESE MEASURED DATA WITH THE RESULTS FROM COMPANION EXPERIMENTS, 'ELECTROSTATIC PROBE (75-107A-01)' AND 'RETARDING POTENTIAL ANALYZER (75-107A-04),' PERMITTED INDIVIDUAL ION CONCENTRATIONS TO BE DETERMINED WITH HIGH ACCURACY. THE EXPERIMENT'S FOUR PRIMARY MECHANICAL COMPONENTS WERE GUARD RING AND ION-ANALYZER TUBE, COLLECTOR AND

PREAMPLIFIER ASSEMBLY, VENT, AND MAIN ELECTRONICS HOUSING. A THREE-STAGE BENNETT TUBE WITH 7- TO 5-CYCLE DRIFT SPACES WAS FLOWN, AND HAS BEEN MODIFIED TO PERMIT ION CONCENTRATION MEASUREMENTS TO BE OBTAINED DOWN TO 120 KM ALTITUDE. SPECIFICALLY, A VENT WAS PROVIDED AT THE REAR OF THE SPECTROMETER, AND THE USUAL FLAT-DISK, ION-CURRENT COLLECTOR WAS REPLACED BY A STACK OF WIRE-MESH GRIDS. THE BALANCE BETWEEN ION-CURRENT SENSITIVITY AND MASS RESOLUTION IN A BENNETT SPECTROMETER MAY BE ALTERED BY CHANGING APPROPRIATE VOLTAGES. THESE VOLTAGE CHANGES WERE CONTROLLED INDEPENDENTLY BY GROUND COMMAND FOR EACH ONE OF THE THREE MASS RANGES: 1 TO 4, 2 TO 18, AND 8 TO 72. MORE COMPLETE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 323-332, APRIL 1973.

----- AE-E, CHAMPION-----

INVESTIGATION NAME- ATMOSPHERIC DENSITY ACCELEROMETER (MESA)

NSSDC ID- 75-107A-02

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

PERSONNEL

PI - K.S.W. CHAMPION
CI - F.A. MARCOS

USAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

MESA (MINIATURE ELECTROSTATIC ANALYZER) OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLE-AXIS ACCELEROMETERS, MOUNTED MUTUALLY AT RIGHT ANGLES, TWO IN THE SPACECRAFT X-Y PLANE AND THE OTHER ALONG THE Z-AXIS. THE INSTRUMENT DETERMINED THE APPLIED ACCELERATION FROM THE ELECTROSTATIC FORCE REQUIRED TO RECENTER A PROOF MASS. THE OUTPUT OF THE DEVICE WAS A DIGITAL PULSE RATE PROPORTIONAL TO THE APPLIED ACCELERATION. THE MEASUREMENTS ALLOWED DETERMINATION OF THE DENSITY OF THE NEUTRAL ATMOSPHERE, MONITORED THE THRUST OF THE ORBIT-ADJUST PROPULSION SYSTEM (OAPS), DETERMINED THE SATELLITE MINIMUM ALTITUDE, MEASURED SPACECRAFT ROLL, AND PROVIDED SOME ATTITUDE-SENSING INFORMATION. SPACECRAFT NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES: 6.E-3 EARTH'S GRAVITY (G) IN OAPS MONITOR MODE; 4.E-4 G BETWEEN 120 KM (PLUS OR MINUS 2 PERCENT) AND 280 KM (PLUS OR MINUS 10 PERCENT); AND 2.E-5 G BETWEEN 180 KM (PLUS OR MINUS 2 PERCENT) AND 400 KM (PLUS OR MINUS 10 PERCENT). NUMBERS IN PARENTHESES REPRESENT ERRORS; IN ADDITION, THERE MAY BE A SYSTEMATIC ERROR OF UP TO PLUS OR MINUS 5 PERCENT DUE TO DRAG COEFFICIENT UNCERTAINTY. THE HIGHEST ALTITUDE WAS DETERMINED ASSUMING THE INSTRUMENT COULD SENSE TO 0.2 PERCENT OF FULL SCALE. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 297-303, APRIL 1973.

----- AE-E, DOERING-----

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 75-107A-03

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.P. DOERING
CI - C.O. BOSTROM

JOHNS HOPKINS U
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE INFORMATION ON THE INTENSITY, ANGULAR DISTRIBUTION, ENERGY SPECTRUM, AND NET FLOW ALONG FIELD LINES, OF ELECTRONS IN THE THERMOSPHERE WITH ENERGIES BETWEEN 2 AND 500 EV. THE INSTRUMENT CONSISTED OF TWO IDENTICAL, OPPOSITELY DIRECTED, HEMISPHERICAL, ELECTROSTATIC ANALYZERS. EACH SPECTROMETER HAD A RELATIVE ENERGY RESOLUTION OF PLUS OR MINUS 2.5 PERCENT AND A GEOMETRIC FACTOR ON THE ORDER OF 0.001 SQ CM-SR, INDEPENDENT OF ELECTRON ENERGY. THREE SEPARATE ENERGY RANGES COULD BE MEASURED: 0 TO 25 EV, 0 TO 100 EV, AND 0 TO 500 EV. MEASUREMENTS FROM THESE INTERVALS COULD BE SEQUENCED IN FIVE DIFFERENT WAYS. DATA COULD BE TAKEN FROM EITHER SENSOR SEPARATELY, OR ALTERNATELY WITH TIME RESOLUTION VARYING FROM 0.25 TO 8 S. THERE WERE TWO DEFLECTION VOLTAGE SCAN RATES DETERMINED BY SPACECRAFT CLOCK. THIS VOLTAGE WAS CHANGED IN 64 STEPS, AND WAS DONE AT 4 OR 16 STEPS PER TELEMETRY FRAME. WITH 16 FRAMES/S, THIS ALLOWED A CHOICE OF EITHER ONE 64-POINT SPECTRUM, OR FOUR 16-POINT SPECTRA IN ONE SECOND. THE LONGEST (8 S) CYCLE OF DATA INVOLVED OBSERVATIONS USING INCREASING VOLTAGE STEPS FOR THE LOWEST, MIDDLE, LOWEST, THEN HIGHEST ENERGY RANGES (IN THAT ORDER) FOR 1 S EACH. A REPEAT FOR DECREASING VOLTAGE STEP COMPLETED THE CYCLE. A MORE DETAILED DESCRIPTION OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 387-392, APRIL 1973.

----- AE-E, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)

NSSDC ID- 75-107A-04

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

PERSONNEL

PI - W.B. HANSON
OI - D.R. ZUCCARO
OI - S. SANATANI
OI - C.R. LIPPENCOTT

U OF TEXAS, DALLAS
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U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE OBSERVATIONS OF VECTOR ION DRIFT VELOCITIES, ION CONCENTRATION AND TEMPERATURE, AND SPACECRAFT POTENTIAL. AN IONOSPHERIC IRREGULARITY INDEX WAS ALSO OBTAINED FROM THE ION CONCENTRATION SENSOR. THE EXPERIMENT CONSISTED OF A RETARDING POTENTIAL ANALYZER WITH FOUR PLANAR SENSOR HEADS. THE SENSOR HEAD USED FOR ION DRIFT MEASUREMENTS WAS CO-LOCATED WITH ANOTHER HEAD, AND ALL WERE SPACED NEARLY EQUALLY, LOOKING OUTWARD FROM THE SATELLITE EQUATOR. SINCE THE SATELLITE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE, THESE HEADS COULD OBSERVE ALONG THE SPACECRAFT VELOCITY VECTOR IN EITHER THE SPIN OR DESPIN MODE OF THE SPACECRAFT. THE PRIMARY PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE ACCURATE ION TEMPERATURES WITH OTHER MEASUREMENTS BEING OF SECONDARY IMPORTANCE. THREE OF THE SENSOR HEADS WERE SIMILAR. THEY HAD TWO GROUNDED ENTRANCE GRIDS, TWO RETARDING GRIDS, A SUPPRESSOR GRID, A SHIELD GRID, AND A COLLECTOR. A LINEAR SWEEP VOLTAGE (32 OR 22 TO 0 V, UP OR DOWN) WAS NORMALLY APPLIED TO THE RETARDING GRIDS IN 0.75 S. INTERPRETATION OF THE RESULTING CURRENT-VOLTAGE PROFILES PROVIDED THE ION TEMPERATURE, THE ION AND ELECTRON CONCENTRATION, SOME ION COMPOSITION INFORMATION, AND VEHICLE POTENTIAL AND PLASMA DRIFT VELOCITY PARALLEL TO THE VELOCITY VECTOR. TWO OF THE THREE SIMILAR SENSORS HAD AN ADDITIONAL GRID BETWEEN THE ENTRANCE AND RETARDING GRIDS IN ORDER TO PROTECT THE INNER GRIDS FROM ION BOMBARDMENT DURING ELECTRON MEASUREMENTS. THE OTHER SIGNIFICANT FEATURE OF THESE TWO SENSORS WAS THAT A SMALL POSITIVE COLLECTOR BIAS COULD BE APPLIED TO ASSURE ADEQUATE ACCESS OF THERMAL ELECTRONS TO THE COLLECTOR. WITH THE RETARDING GRID AT CONSTANT ZERO VOLTS, CURRENT CHANGES COULD BE OBSERVED FOR 3-5 PERIODS TO OBTAIN GRADIENTS OF ION CONCENTRATION. ELECTRON PARAMETERS WERE MEASURED IN A MANNER SIMILAR TO IONS EXCEPT FOR THE LINEAR SWEEP VOLTAGE (-3 OR -2 TO 0 V, UP OR DOWN) RANGE. IONS IN MASS RANGES 1 TO 4, 14 TO 16, 24 TO 32 AND GREATER THAN 40 U COULD BE IDENTIFIED. THE FOURTH SENSOR HEAD WAS FOR THE ION-DRIFT VELOCITY MEASUREMENTS, AND CONSISTED OF FOUR GROUNDED GRIDS, A NEGATIVELY BIASED SUPPRESSOR GRID, AND A FOUR-SEGMENT COLLECTOR. DIFFERENCES IN VARIOUS COLLECTOR SEGMENT CURRENTS PROVIDED ION-DRIFT DIRECTIONAL COMPONENT INFORMATION. MORE DETAILS OF THIS EXPERIMENT ARE AVAILABLE IN 'RADIO SCIENCE,' 8, 4, 333-339, APRIL 1973.

----- AE-E, HAYS-----

INVESTIGATION NAME- VISIBLE AIRGLOW PHOTOMETER (VAE)

NSSDC ID- 75-107A-11

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS
OI - G.G. SHEPHERD
OI - G.R. CARIGNAN
OI - J.C.G. WALKER

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BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED DETAILED DATA ON THE RATES OF EXCITATION OF THE ATOMIC AND MOLECULAR CONSTITUENTS OF THE THERMOSPHERE. THE WAVELENGTH RANGE COVERED, EXPRESSED IN ANGSTROMS, WAS MEASURED IN PAIRS: 7319 AND 6563, 5300 AND DARK, 5577 AND 7319, 2880 AND 5200, 6300 AND 5577, CALIBRATE AND 2880, AND 6563 AND 6300. A PHOTOMETER WAS USED WHICH CONTAINED TWO SEPARATE OPTICAL CHANNELS, A NARROW FIELD OF VIEW AND A WIDE FIELD OF VIEW. SPECTRAL SELECTION WAS ACCOMPLISHED WITH A FILTER WHEEL THAT CONTAINED SIX INTERFERENCE FILTERS AND A DARK AND CALIBRATE POSITION. THE TWO CHANNELS WERE SEPARATED BY 90 DEG. ONE CHANNEL HAD A 3-DEG HALF-ANGLE CONE FIELD OF VIEW FOR HIGH SENSITIVITY AND POINTED NORMALLY TOWARD THE LOCAL ZENITH. THE SECOND HAD A FIELD OF VIEW OF 0.75-DEG HALF CONE FOR HIGH SPATIAL RESOLUTION, POINTING TANGENTLY TO THE SURFACE OF THE EARTH WHEN THE SATELLITE WAS IN THE ORIENTED MODE. BOTH CHANNELS WERE PROTECTED FROM STRAY LIGHT CONTAMINATION DURING THE DAYTIME WITH MULTYSTAGE BAFFLE SYSTEMS. FILTERS WERE OPERATED IN SEVERAL MODES. THE TWO SEPARATE OPTICAL CHANNELS WERE MONITORED AT TIME INTERVALS CONSISTENT WITH THEIR ANGULAR RESOLUTION IN THE SPINNING MODE. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 369-377, APRIL 1973.

----- AE-E, LATH-----

INVESTIGATION NAME- BACKSCATTER UV SPECTROMETER (BUV)

NSSDC ID- 75-107A-16

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.F. HEATH

NASA-GSFC

BRIEF DESCRIPTION

THE BACKSCATTER ULTRAVIOLET INSTRUMENT (BUV) MONITORED THE SPATIAL DISTRIBUTION OF ATMOSPHERIC OZONE BY MEASURING THE INTENSITY OF THE UV RADIATION BACKSCATTERED FROM THE EARTH'S ATMOSPHERE. TO OBTAIN THIS OZONE DISTRIBUTION, THE BUV SUBSYSTEM MEASURED DIRECT SOLAR RADIATION AND BACKSCATTERED UV RADIATION FROM THE DAYTIME SUN-ILLUMINATED ATMOSPHERE. THE EXPERIMENT CONSISTED OF A SPECTROMETER (MONOCHROMATOR) AND A PHOTOMETER. THE MONOCHROMATOR MEASURED THE INTENSITY OF UV RADIATION BACKSCATTER AND REFLECTED RADIATION FROM THE EARTH'S ATMOSPHERE IN 12 WAVELENGTHS (2955 Å TO 3398 Å) IN WHICH OZONE ATTENUATION OCCURS. THE PHOTOMETER MEASURED THE REFLECTED UV RADIATION IN A SINGLE WAVELENGTH SPAN IN WHICH ATTENUATION BY OZONE DOES NOT OCCUR. THE BUV HAD FOUR OPERATING MODES.

----- AE-E, HEDIN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION (NACE)

NSSDC ID- 75-107A-08

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.E. HEDIN

O1 - C.A. REBER

O1 - G.R. CANNIGAN

NASA-GSFC

NASA-GSFC

U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED, IN SITU, THE SPATIAL DISTRIBUTION AND TEMPORAL CHANGES OF THE CONCENTRATIONS OF THE NEUTRAL ATMOSPHERIC SPECIES. IN ADDITION, NEW INSIGHT INTO IN SITU MEASUREMENT TECHNIQUES WAS OBTAINED FROM COMPARISONS OF THESE MEASUREMENTS WITH THOSE OBTAINED FROM OTHER ONBOARD EXPERIMENTS, NAMELY, OPEN SOURCE SPECTROMETER (75-107A-07), SOLAR EUV SPECTROPHOTOMETER (75-107A-06), AND ATMOSPHERIC DENSITY ACCELEROMETER (75-107A-02). THE MASS-SPECTROMETER SENSOR INCLUDED A GOLD-PLATED STAINLESS STEEL THERMALIZING CHAMBER AND ION SOURCE, A HYPERBOLIC ROD QUADRUPOLE ANALYZER, AND AN OFF-AXIS ELECTRON MULTIPLIER. WHEN OPERATING IN THE 'NORMAL' FORMAT, THE ANALYZER MEASURED ALL MASSES IN THE RANGE 1 TO 44 WITH EMPHASIS ON HYDROGEN, HELIUM, OXYGEN, NITROGEN, AND ARGON. ANOTHER FORMAT WAS OPTIMIZED FOR MINOR CONSTITUENT STUDIES OF GAS SPECIES IN THE MEASURED RANGE. SPATIAL RESOLUTION WAS DETERMINED PRIMARILY BY THE MODE OF SPACECRAFT OPERATION. IN ORBIT, THE PRESEALED SPECTROMETER WAS OPENED, AND THE ATMOSPHERIC CONSTITUENTS PASSED THROUGH A KNIFE-EDGED ORIFICE INTO THE THERMALIZATION CHAMBER AND ION SOURCE. SELECTED IONS LEFT THE QUADRUPOLE ANALYZER THROUGH A WEAK FOCUSING LENS AND WERE ACCELERATED INTO AN ELECTRON MULTIPLIER, WHERE THEY WERE TURNED 90 DEG TO STRIKE THE FIRST DYNODE. THE SPECTROMETER HAD A RESOLUTION OF BETTER THAN 1 U FOR ALL MASSES BETWEEN 1 AND 44, AND THE MEASUREMENT SYSTEM HAD A DYNAMIC RANGE OF APPROXIMATELY 1.E8. THERE WAS PROVISION FOR THE INSTRUMENT ORIFICE TO BE COVERED DURING SPACECRAFT THRUSTER OPERATIONS. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 277-285, APRIL 1973.

----- AE-E, HINTEREGGER-----

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 75-107A-06

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - H.F. HINTEREGGER

O1 - D.I. REDD

O1 - L.A. HALL

O1 - J.L. MANSON

O1 - C.W. CHAGNON

USAF GEOPHYS LAB

USAF GEOPHYS LAB

USAF GEOPHYS LAB

USAF GEOPHYS LAB

USAF GEOPHYS LAB

BRIEF DESCRIPTION

EUVS WAS USED TO OBSERVE THE VARIATIONS IN THE SOLAR EUV FLUX IN THE WAVELENGTH RANGE FROM 140 TO 1850 Å AND THE ATMOSPHERIC ATTENUATION AT VARIOUS FIXED WAVELENGTHS. THIS PROVIDED QUANTITATIVE ATMOSPHERIC STRUCTURE AND COMPOSITION DATA. THE INSTRUMENT CONSISTED OF 24 GRAZING-INCIDENCE GRATING MONOCHROMATORS, USING PARALLEL-SLIT SYSTEMS FOR ENTRANCE COLLIMATION AND PHOTOELECTRIC DETECTORS AT THE EXIT SLITS. TWELVE OF THESE MONOCHROMATORS HAD WAVELENGTH SCAN CAPABILITY, EACH WITH 128 SELECTABLE WAVELENGTH POSITIONS, WHICH COULD ALSO AUTOMATICALLY STEP SCAN THROUGH THESE POSITIONS. THE OTHER 12

MONOCHROMATORS OPERATED AT FIXED WAVELENGTHS WITH FIELDS OF VIEW SMALLER THAN THE FULL SOLAR DISK TO AID IN THE ATMOSPHERIC ABSORPTION ANALYSIS. THE SPECTRAL RESOLUTION VARIED FROM 2 TO 54 Å DEPENDING UPON THE PARTICULAR INSTRUMENT. THE FIELD OF VIEW VARIED FROM 60 X 60 DOWN TO 3 X 6 ARC MIN. ALL 24 MONOCHROMATOR-ENTRANCE AXES WERE CO-ALIGNED PARALLEL. A SOLAR POINTING SYSTEM COULD POINT TO 256 DIFFERENT POSITIONS, EXECUTE A 16-STEP ONE-DIMENSIONAL SCAN OR A FULL 256-STEP RASTER. THE TIME RESOLUTION VARIED FROM 0.5 S FOR OBSERVING 12 FIXED WAVELENGTHS UP TO 256 S FOR PROGRAMMING THE EUVS THROUGH ALL POSSIBLE MODES. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 349-360, APRIL 1973.

----- AE-E, NIER-----

INVESTIGATION NAME- OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)

NSSDC ID- 75-107A-07

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.O.C. NIER

O1 - W.E. POTTER

O1 - R. MAUERSBERGER

U OF MINNESOTA

U OF MINNESOTA

U OF MINNESOTA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO CONTRIBUTE TO A STUDY OF THE CHEMICAL, DYNAMIC, AND ENERGETIC PROCESSES THAT CONTROL THE STRUCTURE OF THE THERMOSPHERE BY PROVIDING DIRECT, IN SITU MEASUREMENTS OF BOTH MAJOR AND MINOR NEUTRAL ATMOSPHERIC CONSTITUENTS HAVING MASSES IN THE RANGE FROM 1 TO 48 ATOMIC MASS UNITS (U). A DOUBLE-FOCUSING, MATTACH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WAS FLOWN. TWO ION COLLECTORS WERE INCLUDED TO MEASURE IONS DIFFERING IN MASS BY A FACTOR OF 8; I.E., THE TWO MASS RANGES COVERED WERE 1 TO 8 AND 7 TO 48 U. IN THE ION SOURCE THE NEUTRAL SPECIES WAS IONIZED BY MEANS OF ELECTRON IMPACT. THE ELECTRON ENERGIES WERE SELECTABLE; 75 EV FOR THE HIGH EV MODE AND 25 EV FOR THE LOW-EV MODE. AT ALTITUDES GREATER THAN 380 KM, ION CURRENTS WERE MEASURED WITH AN ELECTRON MULTIPLIER. COUNTS WERE ACCUMULATED FOR 1/20 S BEFORE AUTOMATICALLY SWITCHING TO A DIFFERENT MASS NUMBER. WHILE COMPLETE MASS SPECTRA COULD BE SWEEPED, IN THE COMMON MODE OF OPERATION PEAK STEPPING WAS EMPLOYED, WITH READINGS ON THE PRINCIPAL PEAKS IN THE MASS SPECTRUM BEING REPEATED APPROXIMATELY EVERY 0.5 S AND OTHER SPECIES LESS FREQUENTLY. DATA BELOW 380 KM WERE MEASURED USING AN ELECTROMETER. IN ADDITION TO THE PEAK STEPPING MODE, THERE WERE SEVERAL OTHER OPERATING MODES WHICH WERE SELECTED BY GROUND COMMAND. AMBIENT PARTICLES STRIKING THE ION SOURCE RETAINED ENERGIES LESS THAN 0.1 EV, WHICH WAS NOT HIGH ENOUGH TO OVERCOME THE NEGATIVE SPACE CHARGE POTENTIAL HOLDING THE IONS IN THE BEAM. THOSE AMBIENT PARTICLES THAT DID NOT STRIKE THE ION SOURCE RETAINED THEIR INCOMING ENERGY OF SEVERAL EV AFTER IONIZATION AND ESCAPE INTO THE ACCELERATING REGION OF THE ANALYZER. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 271-276, APRIL 1973.

----- AE-E, RICE-----

INVESTIGATION NAME- CAPACITANCE MANOMETER

NSSDC ID- 75-107A-12

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.J. RICE

AEROSPACE CORP

BRIEF DESCRIPTION

THE CAPACITANCE MANOMETER FLOWN ON AE-E WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WERE ALSO CORRELATED WITH ACCELEROMETER AND ION GAUGE DATA IN EVALUATING SATELLITE DRAG. THE MANOMETER, ALSO REFERRED TO AS PRESSURE SENSOR B (PSB), PROVIDED A DIRECT MEASURE OF ATMOSPHERIC PRESSURE IN THE REGION BELOW 200 KM. THE ACCURACY OF THE PSB GAUGE VARIED FROM ABOUT 10 PERCENT AT 120 KM TO ABOUT 40 PERCENT AT 180 KM. THE PSB CONSISTED OF TWO SPHERICAL, THERMALLY CONTROLLED CHAMBERS, SEPARATED BY A THIN MEMBRANE STRETCHED FLAT AND UNDER RADIAL TENSION. ANY DEFLECTION OF THE DIAPHRAGM CAUSED BY A PRESSURE DIFFERENTIAL BETWEEN THE TWO SIDES CAUSED A CHANGE IN CAPACITANCE BETWEEN THE DIAPHRAGM AND AN ADJACENT ELECTRODE WHICH BIASED AN AC BRIDGE CIRCUIT. AIR WAS ALLOWED INTO ONE OF THE CHAMBERS THROUGH TWO PORTS 180 DEG APART AND PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THUS THE WALL-RAM PRESSURE DIFFERENTIAL WAS SAMPLED TWICE EACH SPACECRAFT REVOLUTION. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 305-314, APRIL 1973.

----- AE-E, RICE-----

INVESTIGATION NAME- COLD CATHODE ION GAUGE

NSSDC ID- 75-107A-13

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.J. RICE

AEROSPACE CORP

BRIEF DESCRIPTION

THE COLD CATHODE ION GAUGE WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WERE CORRELATED WITH ACCELEROMETER AND CAPACITANCE MANOMETER DATA TO EVALUATE SATELLITE DRAG PERFORMANCE. THE ION GAUGE, ALSO REFERRED TO AS PRESSURE SENSOR A (PSA), MEASURED ATMOSPHERIC PRESSURE IN THE REGION BETWEEN 120 AND 370 KM ABOVE THE EARTH'S SURFACE FOR VALUES OF ATMOSPHERIC PRESSURE BETWEEN $1.3E-5$ AND $1.3E-7$ MM. THE ESTIMATED ACCURACY OF THE PSA WAS PLUS OR MINUS 20 PERCENT. THE CYLINDRICALLY SHAPED SENSOR PACKAGE CONSISTED OF A WEDGE-SHAPED ORIFICE, A CATHODE NEAR GROUND POTENTIAL, AN ANODE OPERATING AT ABOUT 1300 VDC, AND A PERMANENT MAGNETIC FIELD OF ABOUT 0.16T (1600 GAUSS). THE GAUGE CONTAINED NO PRIMARY SOURCE OF IONIZING ELECTRONS. THE DISCHARGE WAS INITIATED BY FIELD EMISSION AND WAS SELF-SUSTAINING AT A PRESSURE ABOVE $1.3E-7$ MM. THE ION CURRENT WAS COLLECTED AT THE CATHODE. THE SENSOR WAS MOUNTED ON THE SPACECRAFT, WITH THE ORIFICE PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WHICH WAS NORMAL TO THE ORBITAL PLANE. THE INSTRUMENT WAS OPERATED IN TWO MODES, SPINNING AND DESPUN. WHEN THE SPACECRAFT WAS IN A SPINNING MODE, THE PSA ALTERNATELY SAMPLED THE RAM AND WAKE PRESSURE. WHEN THE SPACECRAFT WAS IN THE DESPUN MODE, THE PSA FACED 30 DEG FROM THE DIRECTION OF MOTION. DATA FROM THIS EXPERIMENT WERE NOT TAPE RECORDED, BUT OBSERVED IN REAL TIME. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 305-314, APRIL 1973.

----- AE-E, SPENCER-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE (NATE)

NSSDC ID- 75-107A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M.W. SPENCER
OI - G.R. CARIGNAN
OI - M.B. NIEMANN

NASA-GSFC
U OF MICHIGAN
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE KINETIC TEMPERATURE OF THE NEUTRAL ATMOSPHERE BY DETERMINING THE INSTANTANEOUS DENSITY OF MOLECULAR NITROGEN IN A SPHERICAL CHAMBER COUPLED TO THE ATMOSPHERE THROUGH A KNIFE-EDGED ORIFICE. ANALYSIS OF THE MEASURED MOLECULAR NITROGEN DENSITY VARIATION OVER A SPIN CYCLE WITH A KNOWLEDGE OF THE SATELLITE'S MOTION AND ORIENTATION LED TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. MEASUREMENTS OF THE AMBIENT NITROGEN DENSITY AND NEUTRAL WIND WERE ALSO OBTAINED. AN ALTERNATE MEASUREMENT OF NEUTRAL TEMPERATURE WAS ALSO UNDERTAKEN, USING A Baffle INSERTED IN FRONT OF THE ORIFICE TO INTERCEPT A PORTION OF THE GAS PARTICLE STREAM ENTERING THE CHAMBER. WHEN THE SATELLITE WAS IN THE DESPUN MODE, THE Baffle WAS MADE TO OSCILLATE IN A STEPWISE FASHION IN ORDER TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICE CHAMBER. THESE CHAMBER DENSITY VARIATIONS WERE INTERPRETED TO YIELD THE NEUTRAL GAS KINETIC TEMPERATURE ALSO. A DUAL-FILAMENT ION SOURCE SAMPLED THE THERMALIZED MOLECULAR NITROGEN IN THE CHAMBER AND PRODUCED AN ION BEAM DENSITY PROPORTIONAL TO THE NITROGEN CHAMBER DENSITY. FROM THE SOURCE, THIS IONIZED NITROGEN BEAM WAS DIRECTED INTO A QUADRUPOLE ANALYZER, TUNED TO PASS THOSE PARTICLES WITH A MASS-TO-CHARGE RATIO (M/E) OF 28, AND ON TO AN ELECTRON MULTIPLIER. THE OUTPUT PULSES WERE AMPLIFIED AND COUNTED. THE SENSOR WAS VACUUM-SEALED PRIOR TO LAUNCH AND OPENED TO THE ATMOSPHERE AFTER THE SPACECRAFT WAS IN ORBIT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 287-296, APRIL 1973.

***** BHASKARA*****

SPACECRAFT COMMON NAME- BHASKARA
ALTERNATE NAMES- SGO, 11392

NSSDC ID- 79-051A

LAUNCH DATE- 06/07/79
LAUNCH SITE- RAPOUSTIN YAR, U.S.S.R.
LAUNCH VEHICLE- INTROS

WEIGHT- 449. KG

SPONSORING COUNTRY/AGENCY

INDIA
U.S.S.R.

ISRO
UNKNOWN

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 95.2 MIN
PERIAPSIS- 512. KM ALT

EPOCH DATE- 06/07/79
INCLINATION- 50.7 DEG
APOAPSIS- 557. KM ALT

PERSONNEL

MG - U.R. RAO
PD - K. KASTURIRANGAN
PS - D.P.N.CALLA
PS - G. JOSEPH

ISRO SATELLITE CENTER
ISRO SATELLITE CENTER
SPACE APPLICATIONS CTR
SPACE APPLICATIONS CTR

BRIEF DESCRIPTION

BHASKARA, THE SECOND INDIAN SATELLITE, WAS LAUNCHED AS PART OF THE SATELLITE-OR-EARTH-OBSERVATIONS (SEO) PROGRAM. IT WAS PLACED IN ORBIT BY A U.S.S.R. VEHICLE LAUNCHED FROM A COSMODROME IN THE U.S.S.R. THE MAIN OBJECTIVES WERE TO CONDUCT EARTH OBSERVATION EXPERIMENTS FOR APPLICATIONS RELATED TO HYDROLOGY, FORESTRY, AND GEOLOGY USING A TWO-BAND TV CAMERA SYSTEM, AND TO CONDUCT OCEAN-SURFACE STUDIES USING A TWO-FREQUENCY SATELLITE MICROWAVE RADIOMETER (SAMIR) SYSTEM. SECONDARY OBJECTIVES WERE TO TEST ENGINEERING AND DATA PROCESSING SYSTEMS, TO COLLECT LIMITED METEOROLOGICAL DATA FROM REMOTE PLATFORMS, AND TO CONDUCT SCIENTIFIC INVESTIGATIONS IN X-RAY ASTRONOMY. BHASKARA WAS A 26-FACED QUASI-SPHERICAL POLYEDRON. IT HAD A HEIGHT OF 1.66 M, AND DIAMETER OF 1.55 M.

----- BHASKARA, CALLA-----

INVESTIGATION NAME- SATELLITE MICROWAVE RADIOMETER (SAMIR)

NSSDC ID- 79-051A-01

INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - D.P.N.CALLA

SPACE APPLICATIONS CTR

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO CONDUCT STUDIES OVER THE INDIAN CONTINENT AND SURROUNDING SEAS USING A 19- AND 23-GHZ MICROWAVE RADIOMETRIC SYSTEM.

***** COS-B*****

SPACECRAFT COMMON NAME- COS-B

ALTERNATE NAMES- COSMIC RAY SATELLITE-B, PL-741H

NSSDC ID- 75-072A

LAUNCH DATE- 08/09/75
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

WEIGHT- 277.5 KG

SPONSORING COUNTRY/AGENCY

INTERNATIONAL

ESA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 2227.0 MIN
PERIAPSIS- 339.6 KM ALT

EPOCH DATE- 08/12/75
INCLINATION- 90.13 DEG
APOAPSIS- 99876. KM ALT

PERSONNEL

PM - G. ALTMANN
PS - R.D. WILLS

ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THE COS-B SCIENTIFIC SATELLITE WAS DEVELOPED BY THE EUROPEAN SPACE AGENCY (ESA) TO STUDY EXTRATERRESTRIAL GAMMA RADIATION IN THE 20-MEV TO 1-GEV ENERGY RANGE FROM A HIGHLY ELLIPTICAL ORBIT OF ROUGHLY 100,000-KM APOGEE, 350-KM PERIGEE, AND NEAR-POLAR INCLINATION. NASA PROVIDED, ON A FULLY REIMBURSABLE BASIS, THE DELTA LAUNCH VEHICLE AND THE ASSOCIATED LAUNCH SERVICES. THE COS-B SPACECRAFT WAS A CYLINDER WITH A DIAMETER OF 140 CM AND A HEIGHT OF 1.1 CM. FOUR MONOPOLE ANTENNAS, PROTRUDING 31.2 CM BELOW THE BOTTOM OF THE CYLINDRICAL BODY, GAVE THE SPACECRAFT A TOTAL EFFECTIVE HEIGHT OF 172.2 CM. THE SPACECRAFT OBTAINED ORIENTATION OF ITS MOMENTUM VECTOR WITH RESPECT TO INERTIAL SPACE USING DATA FROM AN EARTH ALBEDO SENSOR AND A SOLAR SENSOR. SPACECRAFT ATTITUDE WAS ADJUSTED BY A NITROGEN COLD-GAS ATTITUDE CONTROL SYSTEM (ACS). THE ACS INCLUDED TWO SPIN-RATE-ADJUST NOZZLES TO MAINTAIN THE SPIN RATE AT 10 RPM AND TWO PRECESSION NOZZLES TO ADJUST THE MOMENTUM VECTOR. THE SPACECRAFT HAD A PCM/PSK/PM TELEMETRY SYSTEM WITH 6.5-M HZAL-TIME-ONLY TRANSMITTER PROVIDING A SWITCHABLE BIT RATE OF 160 AND 320 BPS AND A PCM/PSK/PM, UP-LINK/DOWN-LINK, RANGE-TONE COMMAND SYSTEM. POWER WAS SUPPLIED BY 9440 SOLAR CELLS MOUNTED ON 12 SUBPANELS ON THE CYLINDRICAL BODY OF THE SPACECRAFT. COMMUNICATIONS, COMMAND, AND CONTROL OF THE COS-B SATELLITE IN ORBIT WERE PROVIDED BY THE ESA ESTRACK NETWORK. THE SPACECRAFT ENCLOSED A GAMMA-RAY ASTRONOMY EXPERIMENT DESCRIBED UNDER 'COS-B CARAVANE COLLABORATION' BELOW. MEMBERS OF THE UNIVERSITY AND RESEARCH GROUPS WHO IMPLEMENTED THIS SATELLITE ARE LISTED IN APPENDIX B2 WITH THEIR AFFILIATIONS.

----- COS-B, CARAYANE COLLABOR.-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY SPARK CHAMBER
EXPERIMENT (25 - 1000 MEV)

NSSDC ID- 75-072A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI -

CARAYANE COLLABOR.

SEE APPENDIX B2

BRIEF DESCRIPTION

THIS EXPERIMENT USED A 16-DECK SPARK CHAMBER TO PERFORM GAMMA-RAY ASTRONOMY IN THE 25- TO 1000- MEV ENERGY INTERVAL. THE MISSION GOALS WERE AS FOLLOWS: (1) TO STUDY THE ANGULAR STRUCTURE OF THE SO-CALLED LINE SOURCE OF RADIATION IN THE GALACTIC PLANE, (2) TO EXAMINE IDENTIFIED POINT SOURCES AND TO INVESTIGATE OTHER CELESTIAL OBJECTS, WHICH MIGHT BE EXPECTED TO EMIT GAMMA RAYS (E.G., SUPERNOVA REMNANTS, QUASARS, NOVAE, ETC.), (3) TO MEASURE THE INTENSITY OF THE ISOTROPIC RADIATION FROM HIGH GALACTIC LATITUDES, (4) TO ASCERTAIN THE ENERGY SPECTRA OF RADIATION FROM ALL OBSERVED SOURCES, (5) TO SEARCH FOR LONG-TERM VARIATIONS IN THE STRENGTH OF SOURCES, AND (6) TO SEARCH FOR SHORT-PERIOD PULSATIONS FROM SOURCES ALREADY KNOWN TO BE PULSARS AT OTHER WAVELENGTHS AND TO DETECT GAMMA-RAY BURSTS. THE INSTRUMENT CONTAINED THE FOLLOWING KEY ELEMENTS (TOP TO BOTTOM): (1) ANTICOINCIDENCE SCINTILLATION DOME, (2) 16-DECK SPARK CHAMBER (SC), (3) TRIGGERING TELESCOPE (TT), (4) ENERGY CALORIMETER (E), AND (5) CASCADE-PARTICLE PLASTIC SCINTILLATOR COUNTER (D). THE ANTICOINCIDENCE COUNTER WAS A DOME OF SCINTILLATION PLASTIC, 10 MM THICK, VIEWED BY NINE PHOTOMULTIPLIER TUBES (PMT). IT DETECTED THE ENTRY OF CHARGED PARTICLES AND INHIBITED THE TRIGGERING OF THE SC. THE SC HAD 16 DECKS, EACH COMPOSED OF A PAIR OF ORTHOGONAL GRIDS OF 192 PARALLEL WIRES. THE TOP 12 DECKS WERE INTERLEAVED WITH TUNGSTEN PLATES, AND THE LOWER 4 DECKS, WITH MOLYBDENUM PLATES. THE SC WAS FILLED WITH NEON AT 12 ATM, PLUS A SMALL PERCENTAGE OF ETHANE. UPON CONVERSION OF A GAMMA RAY INTO AN ELECTRON-POSITRON PAIR, AN 8-KV VOLTAGE PULSE WAS APPLIED ACROSS THE DECKS CAUSING SPARK DISCHARGE ALONG THE IONIZATION TRACKS OF THE PAIR FROM WHICH THE ARRIVAL DIRECTION OF THE GAMMA RAY COULD BE DETERMINED. THE RECHARGE TIME OF THE SC HIGH VOLTAGE WAS 0.1 S. THE TT CONSISTED OF THREE ELEMENTS: A 4-MM-THICK SCINTILLATION COUNTER (B1) ABLE TO IDENTIFY EVENTS IN WHICH AN E-P PAIR LEFT THE SC, A CERENKOV COUNTER (C) OF 50-MM-THICK PLEXIGLASS THAT WAS SENSITIVE TO RELATIVISTIC PARTICLES MOVING IN A DOWNWARD DIRECTION, AND A SECOND SCINTILLATOR (B2) 10 MM THICK. THE PRIMARY OBJECTIVES OF THE TT WERE TO DEFINE THE FIELD OF VIEW, TO DETECT THE DOWNWARD-MOVING ELECTRONS, AND TO PROVIDE THE FAST TRIGGER TO DISCHARGE THE SC. IT WAS POSSIBLE TO RESTRICT THE FIELD OF VIEW OF THE INSTRUMENT BY THE DIVISION OF THE C AND B2 COUNTERS INTO QUADRANTS, WHICH WERE VIEWED BY PMT OUTSIDE THE FIELD OF VIEW. THE PMT OUTPUTS WERE PULSE-HEIGHT ANALYZED TO PROVIDE INFORMATION ON THE NUMBERS OF PARTICLES LEAVING THE SC AND ENTERING THE CALORIMETER, E. THE E UNIT WAS A SINGLE CRYSTAL OF CESIUM IODIDE, 4.5 RADIATION LENGTHS THICK, IN WHICH THE E-P PAIR INITIATED AN ELECTRON-PHOTON CASCADE THAT WAS COMPLETELY ABSORBED AT LOW ENERGIES. AT HIGHER ENERGIES, THE CASCADE PENETRATED TO THE FINAL PLASTIC SCINTILLATOR COUNTER, D. THE OUTPUT OF D WAS ANALYZED TO MEASURE THE NUMBER OF PARTICLES ESCAPING. INFORMATION FROM THE TT COUNTERS AND FROM THE SC PROVIDED A MEASURE OF THE ENERGY LOST BY SCATTERING OR ABSORPTION. THIS QUANTITY MUST BE ADDED TO THE CALORIMETER SIGNAL TO DERIVE THE ENERGY OF THE INCIDENT GAMMA RAY. THE ANTICOINCIDENCE DOME WAS INSTRUMENTED TO DETECT GAMMA-RAY PURSTS, AND A SMALL 80-50 CM ARGON-FILLED PROPORTIONAL COUNTER SENSITIVE TO X-RAYS BETWEEN 2 AND 12 KEV VIEWED PARALLEL TO THE AXIS OF THE MAIN GAMMA-RAY INSTRUMENT TO PROVIDE CONTEMPORARY X-RAY DATA ON AXIALLY LOCATED SOURCES.

***** DMSP 5D-1/F3*****

SPACECRAFT COMMON NAME- DMSP 5D-1/F3

ALTERNATE NAMES- DMSP 14537, DMSP BLOCK 5D-1
DMSP5D1, DMSP-F3

NSSDC ID- 78-042A

LAUNCH DATE- 05/01/78

WEIGHT- 450. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES

DOD-USA7

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 96.89 MIN

PERIAPSIS- 560. KM ALT

EPOCH DATE- 05/02/78

INCLINATION- 97.6 DEG

APOAPSIS- 653. KM ALT

PERSONNEL

MG - J. RIVERS

USA7 SPACE DIVISION

BRIEF DESCRIPTION

DMSP 5D-1/F3 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE OFFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M-LOK SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (INCLUDING THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTED (4) A 9.2-50-1 SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS), BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3-NAUTICAL-MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2-NAUTICAL-MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR M (SSM), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDED THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT X-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE OFFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F3, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 78-042A-01

INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SVS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

AFGWC STAFF

GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP 5D-1/F3 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATED IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM- AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA, FOR DIRECT REABOUT TO TACTICAL SITES. THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F3, SHRM-----

INVESTIGATION NAME- GAMMA-RAY DETECTOR

NSSDC ID- 78-042A-04

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ASTRONOMY

PERSONNEL
PI - J. SHRUM
USAF TECH APPL CTR

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF A FOUR-DETECTOR ARRAY OF CESIUM IODIDE SCINTILLATORS AND PHOTOMULTIPLIER TUBES, EACH SURROUNDED BY A TANTALUM RING SHIELD TO PROVIDE A DIRECTIONAL SYSTEM. EACH DETECTOR WAS POSITIONED SO THAT ITS MOST SENSITIVE DIRECTION FACED 30 DEG FROM THE VERTICAL. PULSE-HEIGHT DISCRIMINATORS WERE USED TO PROVIDE GAMMA-RAY ENERGY LOSS THRESHOLDS OF 0.06, 0.15, AND 0.375 MEV. GAMMA RAYS PRODUCED IN THE ATMOSPHERE BY COSMIC RAYS, PRECIPITATING ELECTRONS, AND OTHER MEANS COULD BE MONITORED WITH THIS INSTRUMENT.

***** DMSP 5D-1/F4*****

SPACECRAFT COMMON NAME- DMSP 5D-1/F4
ALTERNATE NAMES- DMSP 15539, DMSP BLOCK 5D-1
DMSP501, DMSP-F4

NSSDC ID- 79-050A

LAUNCH DATE- 06/06/79 WEIGHT- 450. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/07/79
ORBIT PERIOD- 101.4 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 817. KM ALT APOAPSIS- 839. KM ALT

PERSONNEL
PI - J. RIVERS
USAF SPACE DIVISION

BRIEF DESCRIPTION
DMSP 5D-1/F4 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD-COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT; (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS; (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (INCLUDING THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTED (4) A 9.29 50-M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM, SO THAT SENSORS WERE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR M (SSM), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDED THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F4, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 79-050A-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF
GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP 5D-1/F4 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATED IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .06 KM AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.0 KM. EACH OF THREE ONBOARD RECORDERS HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F4, AFGWC STAFF-----

INVESTIGATION NAME- SSM/T-MICROWAVE TEMPERATURE SOUNDER

NSSDC ID- 79-050A-06 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
AERONOMY

PERSONNEL
PI - AFGWC STAFF
GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE SPECIAL SENSOR MICROWAVE/TEMPERATURE SOUNDER WAS A SEVEN-CHANNEL SCANNING RADIOMETER WHICH MEASURED RADIATION IN THE 5- TO 6-MM WAVELENGTH (50-60 GHZ) REGION -- SPECIFICALLY 50.5, 53.2, 54.35, 54.9, 58.4, 58.825, AND 59.4 GHZ -- TO PROVIDE DATA FOR VERTICAL TEMPERATURES FROM THE EARTH'S SURFACE TO ABOVE 30 KM. IT WAS DESIGNED TO SCAN IN SYNCHRONIZATION WITH THE SPECIAL SENSOR M PACKAGE AND PROVIDED TEMPERATURE SOUNDINGS OVER PREVIOUSLY INACCESSIBLE CLOUDY REGIONS AND AT HIGHER ALTITUDES THAN WERE ATTAINABLE FROM THE SSM. THE SSM/T OPERATED IN THE ABSORPTION BAND OF MOLECULAR OXYGEN, BY CHOOSING FREQUENCIES WITH DIFFERENT ABSORPTION COEFFICIENTS ON THE WING OF THE OXYGEN ABSORPTION BAND, A SERIES OF WEIGHTING FUNCTIONS PEAKING AT PRESELECTED ALTITUDES WAS OBTAINED. THE RADIOMETER SCANNED ACROSS THE NADIR TRACK ON SEVEN SCAN POSITIONS AND TWO CALIBRATION POSITIONS (COLD SKY AND 300 DEG K). THE Dwell TIME FOR THE CROSSTRACK AND CALIBRATION POSITIONS WAS 2.7 S EACH. THE TOTAL SCAN PERIOD WAS 32 S. THE INSTRUMENT HAD AN INSTANTANEOUS FIELD OF VIEW OF 12 DEG AND SCANNED PLUS OR MINUS 36 DEG FROM THE NADIR.

----- DMSP 5D-1/F4, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 79-050A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL
USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE SPECTROMETER CONSISTED OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINTED TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAD A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAD A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERED THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE, FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT WAS OBTAINED IN 1 S.

----- DMSP 5D-1/F4, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- 79-050A-05

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL

PI - R.C. BAGALYN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDED MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.0E/CUBIC CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 DEG K. THE PEA MEASURED ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA WAS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY.

----- DMSF 50-1/F4, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- 79-050A-04

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - A.L. SNYDER

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPED FROM 1.5 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE WAS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MAN-MADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (F0F2). THE F0F2 PARAMETER IS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT COULD DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

***** DYNAMICS EXPLORER 1*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER 1

ALTERNATE NAMES- DE-A, DE 1

DYNAMICS EXPLORER-A

NSSDC ID- R1-070A

LAUNCH DATE- 08/03/81

WEIGHT- 409. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 410.8 MIN
PERIAPSIS- 567.6 KM ALT

EPOCH DATE- 08/03/81
INCLINATION- 89.9 DEG
APOAPSIS- 23289.6 KM ALT

PERSONNEL

SC - R.B. WEINREB
SC - E.R. SCHMERLING
PM - G.D. HOGAN
PS - R.A. HOFFMAN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE GENERAL OBJECTIVE OF THE DYNAMICS EXPLORER (DE) MISSION WAS TO INVESTIGATE THE STRONG INTERACTIVE PROCESSES COUPLING THE HOT, TENUOUS, CONVECTING PLASMAS OF THE MAGNETOSPHERE AND THE COOLER, DENSER PLASMAS AND GASES COEXISTING IN THE EARTH'S IONOSPHERE, UPPER ATMOSPHERE, AND PLASMASPHERE. TWO SATELLITES, LAUNCHED TOGETHER, DE 1 AND 2, WERE PLACED IN POLAR COPLANAR ORBITS PERMITTING SIMULTANEOUS MEASUREMENTS AT HIGH AND LOW ALTITUDES IN THE SAME FIELD-LINE REGION. THE DE 1 SPACECRAFT (HIGH-ALTITUDE MISSION) USED AN ELLIPTICAL ORBIT SELECTED TO ALLOW (1) MEASUREMENTS EXTENDING FROM THE HOT MAGNETOSPHERIC PLASMA THROUGH THE PLASMASPHERE TO THE COOL IONOSPHERE; (2) GLOBAL AURORAL IMAGING, WAVE MEASUREMENTS IN THE HEART OF THE MAGNETOSPHERE, AND CROSSING OF AURORAL FIELD LINES AT SEVERAL EARTH RADII; AND (3) MEASUREMENTS FOR SIGNIFICANT PERIODS ALONG A MAGNETIC FIELD FLUX TUBE. THE SPACECRAFT APPROXIMATED A SHORT RIGHT CYLINDER 137 CM IN DIAMETER AND 115 CM HIGH. THE ANTENNAS IN THE X-Y PLANE WERE 200-M TIP-TO-TIP, AND ON THE Z-AXIS WERE 9-M TIP-TO-TIP. TWO 6-M BOOMS WERE PROVIDED FOR REMOTE MEASUREMENTS. THE TOTAL MASS OF THE INSTRUMENTS WAS 55 KG. POWER WAS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT WAS SPIN STABILIZED. THE SPIN AXIS WAS 90 DEG FROM THE ORBIT NORMAL AND THE SPIN RATE WAS 10 PLUS OR MINUS 0.1 RPM. A PULSED CODE MODULATION (PCM) TELEMETRY DATA SYSTEM WAS USED THAT OPERATED IN REAL TIME OR A TAPE RECORDER MODE. DATA WERE ACQUIRED ON A SCIENCE PROBLEM ORIENTED BASIS, WITH CLOSELY COORDINATED OPERATIONS OF THE VARIOUS INSTRUMENTS, BOTH SATELLITES, AND SUPPORTIVE EXPERIMENTS. DATA ACQUIRED FROM THE INSTRUMENTS WERE TEMPORARILY STORED ON TAPE RECORDERS BEFORE TRANSMISSION AT AN 8:1 PLAYBACK-TO-RECORD RATIO. SINCE COMMANDS WERE STORED IN A COMMAND MEMORY UNIT, SPACECRAFT OPERATIONS WERE NOT REAL TIME, EXCEPT FOR THE TRANSMISSION OF WIDEBAND ANALOG DATA FROM THE PLASMA WAVE INSTRUMENT (01-070A-02).

----- DYNAMICS EXPLORER 1, BURCH-----

INVESTIGATION NAME- HIGH ALTITUDE PLASMA INSTRUMENT

NSSDC ID- R1-070A-05

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.L. BURCH
OI - R.A. HOFFMAN
OI - J.D. WINNINGHAM
OI - D.M. KLUMPAR

SOUTHWEST RES INST
NASA-GSFC
SOUTHWEST RES INST
U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE HIGH-ALTITUDE PLASMA INSTRUMENT (HAPI) CONSISTED OF AN ARRAY OF FIVE ELECTROSTATIC ANALYZERS CAPABLE OF MAKING MEASUREMENTS OF THE PHASE-SPACE DISTRIBUTIONS OF ELECTRONS AND POSITIVE IONS FROM 5 EV TO 32 KEV AS A FUNCTION OF PITCH ANGLE. THIS INVESTIGATION PROVIDED DATA CONTRIBUTING TO THE STUDIES OF (1) THE COMPOSITION AND ENERGY OF BIRKELAND CURRENT CHARGE CARRIERS, (2) THE DYNAMIC CONFIGURATION OF HIGH-LATITUDE MAGNETIC FLUX TUBES, (3) AURORAL PARTICLE SOURCE REGIONS AND ACCELERATION MECHANISMS, (4) THE ROLE OF E PARALLEL TO B, AND E PERPENDICULAR TO B IN THE MAGNETOSPHERE-IONOSPHERE SYSTEM, (5) THE SOURCES AND THE EFFECT OF POLAR CAP PARTICLE FLUXES, (6) THE TRANSPORT OF PLASMA WITHIN AND THROUGH THE MAGNETOSPHERIC CLEFTS, (7) WAVE-PARTICLE INTERACTIONS, AND (8) HOT-COLD PLASMA INTERACTIONS. THIS INSTRUMENT CONSISTED OF FIVE IDENTICAL DETECTOR HEADS, EACH HAVING AN ELECTROSTATIC ANALYZER (OF THE 1515-2 TYPE) AND TWO SENSORS (ONE ELECTRON CHANNEL AND ONE ION CHANNEL). THE DETECTOR HEADS WERE MOUNTED ON THE MAIN BODY. ONE OF THE DETECTOR HEADS WAS MOUNTED IN THE SPIN PLANE, TWO WERE OFFSET BY PLUS AND MINUS 12 DEG, AND TWO WERE OFFSET BY PLUS AND MINUS 45 DEG. ONE DETECTOR SWEEPED WITHIN A FEW DEG OF THE FIELD LINE DURING EACH ROTATION OF THE SPACECRAFT, EXCEPT WHEN THE MAGNETIC FIELD WAS GREATLY DEFORMED FROM ITS MERIDIAN PLANE. THE BASIC MODE OF OPERATION PROVIDED A 32-POINT ENERGY SPECTRUM FROM EACH SENSOR, BUT THE VOLTAGES ON THE ELECTROSTATIC ANALYZERS WERE PROGRAMMABLE TO ALLOW FOR OPERATION OVER LIMITED PORTIONS OF THE ENERGY SPECTRUM, OR AT HIGHER TIME RESOLUTION WITH REDUCED ENERGY RESOLUTION. THE ENERGY RESOLUTION WAS 32 PERCENT, AND THE ANGULAR RESOLUTION WAS 2.5 DEG FWHM. THE GEOMETRIC FACTOR WAS 4.0E+05 CM SR, AND THE SAMPLING SPEED WAS 64/S.

----- DYNAMICS EXPLORER 1, CHAPPELL-----

INVESTIGATION NAME- RETARDING ION MASS SPECTROMETER

NSSDC ID- R1-070A-04

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.R. CHAPPELL
OI - P.M. BANKS
OI - W.B. HANSON
OI - J.H. HOFFMAN
OI - A.F. HADY
OI - G.R. CARIGNAN

NASA-MSFC
STANFORD U
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
U OF MICHIGAN
U OF MICHIGAN

BRIEF DESCRIPTION

THE RETARDING ION MASS SPECTROMETER (RIMS) CONSISTED OF A RETARDING POTENTIAL ANALYZER FOR ENERGY ANALYSIS IN SERIES WITH A MAGNETIC ION MASS SPECTROMETER FOR MASS ANALYSIS. THIS INSTRUMENT WAS DESIGNED TO OPERATE IN TWO BASIC CONFIGURABLE MODES: A HIGH-ALTITUDE MODE IN WHICH THE DENSITY, TEMPERATURE, AND BULK FLOW CHARACTERISTICS OF H+, HE+, AND O+ IONS WERE MEASURED, AND A LOW-ALTITUDE MODE THAT CONCENTRATED ON THE COMPOSITION IN THE 1- TO 32-U RANGE. THIS INVESTIGATION PROVIDED INFORMATION ON (1) THE DENSITIES OF H+, HE+, AND O+ IONS IN THE IONOSPHERE, PLASMASPHERE, PLASMA TROUGH, AND POLAR CAP (INCLUDING THE DENSITY DISTRIBUTION ALONG THE MAGNETIC VECTOR IN THE VICINITY OF THE SATELLITE APOGEE); (2) THE TEMPERATURE OF H+, HE+, AND O+ IONS IN THE IONOSPHERE, PLASMASPHERE, PLASMA TROUGH, AND POLAR CAP (ENERGY RANGE 0-65 EV); (3) THE BULK FLOW VELOCITIES OF H+, HE+, AND O+ IN THE PLASMAPAUSE, PLASMA TROUGH AND POLAR CAP; (4) THE CHANGING CHARACTER OF THE COLD PLASMA DENSITY, TEMPERATURE, AND BULK FLOW IN REGIONS OF INTERACTION WITH HOT PLASMA SUCH AS AT THE BOUNDARY BETWEEN THE PLASMASPHERE AND THE RING CURRENT; AND (5) THE DETAILED COMPOSITION OF IONOSPHERIC PLASMA IN THE 1- TO 32-U RANGE. HE++ AND O++ ARE ALSO MEASURED. THE INSTRUMENT CONSISTED OF THREE DETECTOR HEADS. ONE LOOKED OUT IN THE RADIAL DIRECTION, AND THE OTHER TWO WERE ALONG THE PLUS AND MINUS SPIN AXIS DIRECTION. EACH DETECTOR HAD A 55 DEG HALF-CONE ACCEPTANCE ANGLE. THE DETECTOR HEADS HAD A GRIDDED NEARLY COLLINEATING APERTURE WHERE THE RETARDING ANALYSIS WAS PERFORMED, FOLLOWED BY A PARALLEL PLATE CERAMIC MAGNETIC MASS ANALYZER WITH THREE SEPARATE EXIT SLITS CORRESPONDING TO ION MASSES IN THE RATIO 1:4:16. IONS EXITING FROM THESE SLITS WERE DETECTED WITH ELECTRON MULTIPLIERS. IN THE APOGEE MODE, THE THERMAL PARTICLE FLUXES WERE MEASURED AS THE POTENTIAL ON A SET OF RETARDING GRIDS WAS STEPPED THROUGH A SEQUENCE OF SETTINGS. IN THE PERIGEE MODE, THE RETARDING GRIDS WERE GROUNDING AND THE DETECTOR UTILIZED A CONTINUOUS ACCELERATION POTENTIAL SWEEP

THAT FOCUSED THE MASS RANGES FROM 1 TO 2, 4 TO 10, AND 14 TO 34 U ON THE LOW-, MID-, AND HIGH-MASS SENSORS, RESPECTIVELY.

----- DYNAMICS EXPLORER 1, CORONITI-----

INVESTIGATION NAME- AURORAL PHYSICS

NSSDC ID- 81-070A-07

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
UPPER ATMOSPHERE RESEARCH

PERSONNEL

PI - F.V. CORONITI	U OF CALIF, LA
O1 - C.F. KENNEL	U OF CALIF, LA
O1 - J.E. MAGGS	U OF CALIF, LA

BRIEF DESCRIPTION

THE PRIMARY GOAL OF THIS INVESTIGATION WAS TO USE THE RESULTS FROM OTHER EXPERIMENTS, PARTICULARLY 81-070A-03 (FRANK) TO TEST PREVIOUS THEORETICAL MODELS AND TO DEVELOP NEW ONES, WITH EMPHASIS ON RESEARCH AREAS RELATED TO AURORAL ARCS, FIELD-ALIGNED CURRENTS, PLASMA WAVE TURBULENCE ASSOCIATED WITH ANOMALOUS RESISTANCE, GENERATION OF AURORAL ELECTRON BEAMS, PRODUCTION OF KILOMETRIC AND VLF HISS RADIATION, AND SPREAD-F. IN ADDITION, CORRELATION STUDIES WERE ORGANIZED BY SELECTING EVENTS THAT WERE INTERESTING TO THE VARIOUS INVESTIGATORS AND DATA REDUCTION PROCEDURES WERE SUGGESTED TO FACILITATE COMPARISON AND INTERPRETATION OF THE DATA.

----- DYNAMICS EXPLORER 1, FRANK-----

INVESTIGATION NAME- GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS

NSSDC ID- 81-070A-03

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
IONOSPHERES

PERSONNEL

PI - L.A. FRANK	U OF IOWA
O1 - K.L. ACKERSON	U OF IOWA
O1 - R.L. CAROVILLANO	BOSTON COLLEGE
O1 - R.H. FATHER	BOSTON COLLEGE

BRIEF DESCRIPTION

THE SPIN-SCAN AURORAL IMAGER (SAI) PROVIDED GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS. IT ACQUIRED (1) IMAGES AT SEVERAL VISIBLE WAVELENGTHS; (2) IMAGES WITHIN A VACUUM ULTRAVIOLET 'WINDOW', WHICH ALLOWED USABLE IMAGING OF THE AURORA IN THE SUNLIT IONOSPHERE; AND (3) PHOTOMETRIC MEASUREMENTS OF THE HYDROGEN CORONA. THIS INVESTIGATION PROVIDED DATA THAT SIGNIFICANTLY ADVANCE THE KNOWLEDGE OF (1) THE SPATIAL AND TEMPORAL CHARACTER OF THE ENTIRE AURORAL OVAL AT BOTH VISIBLE AND VACUUM ULTRAVIOLET WAVELENGTHS (WITH GOOD TIME RESOLUTION); (2) THE ASSOCIATION OF AURORAL AND MAGNETOSPHERIC PLASMAS WITH THE DIVERSE AURORAL EMISSION FEATURES; (3) THE RELATIONSHIP OF THE AURORAL EMISSIONS WITH FIELD-ALIGNED CURRENTS; (4) THE ENERGY DEPOSITED IN THE AURORAL IONOSPHERE BY CHARGED PARTICLES; (5) THE ACCELERATION MECHANISM RESPONSIBLE FOR 'INVERTED-V' PRECIPITATION EVENTS; (6) THE ROLE OF THE POLAR CAP AND MAGNETOTAIL IN AURORAL AND MAGNETOSPHERIC DYNAMICS; AND (7) THE TIME-DEPENDENT DISTRIBUTION OF NEUTRAL HYDROGEN IN THE RING CURRENT AND POLAR REGIONS. OF THE THREE PHOTOMETERS, TWO MEASURED RADIATION IN THE VISIBLE, AND ONE MEASURED IN THE UV. A FULL IMAGE WAS 36 DEG BY 120 DEG. IN ANGSTROMS, THE WAVELENGTHS MEASURED WERE 3914, 5577, 6300, 3860, 1304, 1216, 1400-1600, AND 1400-1700. THE SENSITIVITY WAS APPROXIMATELY 1/3 KR PER PIXEL COUNT AND WAS WAVELENGTH DEPENDENT. FOR EACH PHOTOMETER, THE TIME RESOLUTION WAS MINUTES PER IMAGE. FOR VISIBLE WAVELENGTHS, THE PHOTOMETERS HAD A WIDE-ANGLE COLLIMATOR; A SUPER-REFLECTING SCANNING MIRROR; A MIRROR-DRIVE MOTOR; A QUARTZ FIELD LENS; AN IMAGE-VIEWING ASSEMBLY OF FIELD-STOP, PINHOLE AND COLLIMATING LENS; A FILTER WHEEL WITH NARROW-BAND INTERFERENCE FILTERS; AND A SMALL PHOTOMULTIPLIER TUBE WITH AN EXTENDED RED PHOTOCATHODE. THE VACUUM ULTRAVIOLET IMAGING PHOTOMETER WAS A SPIN-SCAN NEWTONIAN TELESCOPE. THE FIRST OPTICAL ELEMENT WAS AN ALUMINUM SCANNING MIRROR WITH A MGf2 OVERCOAT. THE COLLIMATION AND MIRROR DRIVE WERE SIMILAR TO THAT DESCRIBED PREVIOUSLY FOR THE VISIBLE IMAGING PHOTOMETER. A FILTER WHEEL WITH MGf2, CAF2, AND BAF2 FILTERS ALLOWED GLOBAL IMAGING FROM 1370 A TO 1700 A, AT 1304 A, 1356 A, AND 1216 A. THE DETECTOR WAS A PHOTOMULTIPLIER TUBE WITH A CS1 PHOTOCATHODE AND A MGf2 WINDOW.

----- DYNAMICS EXPLORER 1, HELLIWELL-----

INVESTIGATION NAME- CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS

NSSDC ID- 81-070A-08

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
RADIO PHYSICS

PERSONNEL

PI - R.A. HELLIWELL	STANFORD U
O1 - T.F. BELL	STANFORD U
O1 - D.L. CARPENTER	STANFORD U
O1 - C.G. PARK	STANFORD U
O1 - J.B. REAGAN	LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INVESTIGATION USED A GROUND-BASED VERY-LOW-FREQUENCY/LOW-FREQUENCY (VLF/LF) (0.5-200 KHZ) TRANSMITTER LOCATED AT SIPLE, ANTARCTICA, AT AN L VALUE OF ABOUT 4, AND THE BROAD-BAND MAGNETIC FIELD DETECTOR FROM EXPERIMENT 81-070A-02. THE PRIMARY OBJECTIVE OF THE INVESTIGATION WAS TO DETERMINE THE RELATIONSHIP BETWEEN VLF/LF WAVES AND ENERGETIC ELECTRONS IN THE MAGNETOSPHERE WITH EMPHASIS ON WAVE GROWTH, STIMULATED EMISSIONS, AND WAVE-INDUCED PERTURBATIONS OF THE ENERGETIC ELECTRONS. OTHER OBJECTIVES WERE TO (1) DETERMINE HOW WAVE PROPAGATION FROM BOTH GROUND AND MAGNETOSPHERIC SOURCES WAS AFFECTED BY FIELD-ALIGNED PLASMA STRUCTURES SUCH AS THE PLASMAPAUSE AND DUCTS OF ENHANCED IONIZATION, (2) USE THE WAVE DATA TO DESCRIBE THE STRUCTURE OF THE PLASMAPAUSE AND THE DISTRIBUTION OF IONIZATION ALONG FIELD-ALIGNED DUCTS, AND (3) STUDY THE EFFECTS OF EARTH POWER-LINE RADIATION AND OTHER VLF WAVE ACTIVITY. THE SPACECRAFT INSTRUMENTATION FOR THIS EXPERIMENT CONSISTS OF THE LINEAR WIDE BAND RECEIVER PROVIDED BY THE PLASMA WAVE INSTRUMENT (81-070A-02). THE BROAD-BAND MAGNETIC FIELD DATA WERE OBTAINED FROM THE LOOP ANTENNA, SELECTABLE IN THREE BANDS: 2 TO 4, 4 TO 8, AND 8 TO 16 KHZ. THE SENSITIVITY WAS 5.E-9 NT AND THE DYNAMIC RANGE WAS 100 DB IN SEVEN GAIN STEPS.

----- DYNAMICS EXPLORER 1, SHAWHAN-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 81-070A-02

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - S.D. SHAWHAN	U OF IOWA
O1 - D.A. GURNETT	U OF IOWA

BRIEF DESCRIPTION

THE PLASMA WAVE INSTRUMENT (PW1) MEASURED ELECTRIC FIELDS FROM 1 HZ TO 2 MHZ, MAGNETIC FIELDS FROM 1 HZ TO 400 KHZ, AND THE DC POTENTIAL DIFFERENCE BETWEEN THE ELECTRIC DIPOLE ELEMENTS. THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE THE SPATIAL, TEMPORAL, SPECTRAL, AND WAVE CHARACTERISTICS (PARTICULARLY THE POINTING VECTOR COMPONENT) ALONG THE MAGNETIC FIELD LINE) AND THE WAVE POLARIZATION FOR EXTREMELY-LOW-FREQUENCY (ELF), VERY-LOW-FREQUENCY (VLF), AND HIGH-FREQUENCY (HF) NOISE PHENOMENA. OF SPECIAL INTEREST WERE THE AURORAL KILOMETRIC RADIATION AND VLF HISS, AND A VARIETY OF ELECTROSTATIC WAVES THAT MAY CAUSE FIELD-ALIGNED ACCELERATION OF PARTICLES. THE INVESTIGATION MADE USE OF THE LONG DIPOLE ANTENNAS IN THE SPIN PLANE AND Z AXIS AND A MAGNETIC LOOP ANTENNA. A SINGLE-AXIS SEARCH COIL MAGNETOMETER AND A SHORT ELECTRIC ANTENNA WERE INCLUDED FOR LOW-FREQUENCY MEASUREMENTS AND ELECTROSTATIC NOISE AT SHORT WAVELENGTHS. THE ELECTRONICS CONSISTED OF (1) A WIDEBAND/LONG BASELINE RECEIVER WITH A BANDWIDTH OF 10 OR 40 KHZ FROM 0-2 MHZ; (2) A SWEEP-FREQUENCY CORRELATOR, CONTAINING TWO SWEEP-FREQUENCY RECEIVERS AND PHASE DETECTORS, SWEEPING 100 HZ TO 400 KHZ IN 32 SECONDS, AND GAVE THE PHASE BETWEEN MAGNETIC AND ELECTRIC COMPONENTS OF THE FIELD; (3) A LOW-FREQUENCY CORRELATOR CONTAINING TWO FILTER RECEIVERS AND PHASE DETECTORS. EIGHT FILTERS IN THE RANGE 1.7B-100 HZ WERE SWEEPED IN 8 S; (4) DC MONITORS THAT MEASURED THE VOLTAGE DIFFERENCE BETWEEN THE TWO SETS OF LONG DIPOLE ANTENNAS; AND (5) A LINEAR WIDEBAND RECEIVER, SELECTABLE FROM 2- TO 4-, 4- TO 8-, OR 8- TO 16-KHZ BANDS.

----- DYNAMICS EXPLORER 1, SHELLEY-----

INVESTIGATION NAME- HOT PLASMA COMPOSITION

NSSDC ID- 81-070A-06

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E.G. SHELLEY	LOCKHEED PALO ALTO
O1 - R.G. JOHNSON	LOCKHEED PALO ALTO
O1 - R.D. SHARP	LOCKHEED PALO ALTO
O1 - J. GEISS	U OF BERNE
O1 - P.B. EBERHARDT	U OF BERNE
O1 - M. BALSIGER	U OF BERNE
O1 - D.T. YOUNG	U OF BERNE
O1 - A. GHIELMETTI	U OF BERNE
O1 - B.A. WHALEN	NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE ENERGY ION COMPOSITION SPECTROMETER (EICS) HAD HIGH SENSITIVITY AND HIGH RESOLUTION, AND COVERED THE ENERGY RANGE FROM 0 TO 17 KEV PER UNIT CHARGE AND THE MASS RANGE FROM 1 TO 138 U. THIS INVESTIGATION PROVIDED DATA USED IN INVESTIGATING THE STRONG COUPLING MECHANISM BETWEEN THE MAGNETOSPHERE AND THE IONOSPHERE THAT RESULTS IN LARGE FLUXES OF ENERGY H^+ IONS BEING ACCELERATED FROM THE IONOSPHERE AND INJECTED INTO THE MAGNETOSPHERE DURING MAGNETIC STORMS. THE PROPERTIES OF THE MINOR IONIC SPECIES SUCH AS He^+ AND He^{++} RELATIVE TO THE MAJOR CONSTITUENTS OF THE ENERGY MAGNETOSPHERE PLASMA WERE ALSO STUDIED IN ORDER TO EVALUATE THE RELATIVE IMPORTANCE OF THE DIFFERENT SOURCES OF THE PLASMA AND OF VARIOUS ENERGIZATION, TRANSPORT, AND LOSS PROCESSES THAT MAY BE MASS- OR CHARGE-DEPENDENT. THE INSTRUMENT WAS SIMILAR TO ONE FLOWN ON THE ISEE 1 SATELLITE. IT CONSISTED OF A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER, FOLLOWED BY A COMBINED CYLINDRICAL ELECTROSTATIC-MAGNETIC MASS ANALYZER, WITH ELECTRON MULTIPLIERS USED AS DETECTORS. THE ENERGY ANALYZER COULD BE OPERATED IN TWO BASIC ENERGY RANGES, LOW AND HIGH. IN THE HIGH-ENERGY RANGE, THE PLATE POTENTIALS WERE PROGRAMMABLE IN 32 STEPS, SUCH THAT THE ENERGY PER UNIT CHARGE WAS MEASURED IN THE RANGE BETWEEN 0.10 AND 17 KEV WITH NEARLY EQUAL LOGARITHMIC STEPS. AT THE LOWEST STEP, THE ANALYZER BECAME TRANSPARENT TO ALL IONS WITH ENERGY LESS THAN ABOUT 150 EV. IN THIS LOW-ENERGY RANGE, THE ANALYZER WAS HELD ON THIS STEP AND INTEGRAL ENERGY ANALYSIS BETWEEN ZERO AND 150 EV WAS PERFORMED WITH A RETARDING POTENTIAL ANALYZER THAT PRECEDED THE PREACCELERATION SECTION. THE MASS ANALYZER CONSISTED OF A CYLINDRICAL-PLATE ELECTROSTATIC ANALYZER BETWEEN THE POLES OF A PERMANENT MAGNET. OPEN MULTIPLIERS WERE USED WITH PULSE-AMPLITUDE DISCRIMINATION AS THE MASS ANALYZER DETECTORS IN ORDER TO IMPROVE THE MASS SEPARATION CHARACTERISTICS OF THE SPECTROMETER. THE ENERGY RESOLUTION $\Delta E/E$ (INTERNAL) WAS 5 PERCENT. THE MASS RESOLUTION $M/\Delta M$ WAS LESS THAN OR EQUAL TO 19 ON THE FOCUS LINE. THE FUNDAMENTAL MEASUREMENT PERIOD ΔT (PER MASS/ENERGY/ANGLE) WAS 31 MILLISEC. ON THE HIGH-ENERGY RANGE THE SENSITIVITY WAS ABOUT 0.7 50 CM-STER-EV AND FOR THE LOW-ENERGY RANGE THAT VALUE WAS 0.05 50 CM-STER-EV. IN THE MAIN MODE OF OPERATION THE INSTRUMENT SCANNED ENERGY FAST AND MASS SLOW IN A 64:5 PERIOD.

----- DYNAMICS EXPLORER 1, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD OBSERVATIONS

NSSDC ID- 81-070A-01

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M. SUGIURA	NASA-GSFC
OI - B.G. LEDLEY	NASA-GSFC
OI - W.M. FARTHING	NASA-GSFC
OI - L.J. CAMILL, JR.	U OF MINNESOTA

BRIEF DESCRIPTION

THIS INVESTIGATION USED A TRIAXIAL FLURGATE MAGNETOMETER (MAG-A), SIMILAR TO ONE ON BOARD DE 2, TO OBTAIN VECTOR MAGNETIC FIELD DATA NEEDED TO STUDY THE MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE COUPLING. THE PRIMARY OBJECTIVE OF THIS INVESTIGATION WAS TO OBTAIN MEASUREMENTS OF FIELD-ALIGNED CURRENTS IN THE AURORAL OVAL AND OVER THE POLAR CAP AT TWO DIFFERENT ALTITUDES. THIS WAS ACCOMPLISHED USING THE TWO SPACECRAFT AND CORRELATIONS OF THESE MEASUREMENTS WITH OBSERVATIONS OF ELECTRIC FIELDS, PLASMA WAVES, SUPRATHERMAL PARTICLES, THERMAL PARTICLES, AND WITH AURORAL IMAGES OBTAINED FROM INVESTIGATION 81-070A-03. THE MAGNETOMETER INCORPORATED ITS OWN 12-BIT A-D CONVERTER, A 4-BIT DIGITAL COMPENSATION REGISTER FOR EACH AXIS, AND A SYSTEM CONTROL TO GENERATE A 48-BIT DATA WORD CONSISTING OF A 16-BIT REPRESENTATION OF THE FIELD MEASURED ALONG EACH OF THE THREE MAGNETOMETER AXES. TRACK AND HOLD MODULES WERE USED TO OBTAIN SIMULTANEOUS SAMPLES ON ALL THREE AXES. INSTRUMENT BANDWIDTH WAS 25 HZ. THE INSTRUMENT RANGE WAS UP TO 61,000 NT, THE ACCURACY WAS PLUS OR MINUS 4 NT, AND THE RESOLUTION WAS PLUS OR MINUS 1.5 NT IN THE 61,000 NT RANGE, PLUS OR MINUS 0.25 NT IN THE 1,000 NT RANGE, AND PLUS OR MINUS 0.02 NT IN THE 80 NT RANGE. THE MAGNETOMETER'S DIGITAL COMPENSATION OF THE AMBIENT FIELD WAS IN PRECISE 8000 NT INCREMENTS.

***** DYNAMICS EXPLORER 2*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER 2

ALTERNATE NAMES- DE-2, DE 2
DYNAMICS EXPLORER-B

NSSDC ID- 81-070B

LAUNCH DATE- 08/03/81	WEIGHT- 403. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES	
LAUNCH VEHICLE- DELTA	

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	
ORBIT PERIOD- 98. MIN	
PERIAPSIS- 309. KM ALT	

EPOCH DATE- 08/03/81
INCLINATION- 89.99 DEG
APOAPSIS- 1012.0 KM ALT

PERSONNEL

MG - M.B. WEINRED
SC - E.R. SCHERLING
PM - G.D. HOGAN
PS - R.A. HOFFMAN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE DE 2 SPACECRAFT (LOW-ALTITUDE MISSION) COMPLEMENTED THE HIGH-ALTITUDE MISSION (DE 1) AND WAS PLACED INTO AN ORBIT WITH A PERIGEE SUFFICIENTLY LOW TO PERMIT MEASUREMENTS OF NEUTRAL COMPOSITION, TEMPERATURE, AND WIND. THE APOGEE WAS HIGH ENOUGH TO PERMIT MEASUREMENTS ABOVE THE INTERACTION REGIONS OF SUPRATHERMAL IONS AND ALSO PLASMA FLOW MEASUREMENTS AT THE FEET OF THE MAGNETOSPHERIC FIELD LINES. THE SPACECRAFT APPROXIMATED A SHORT RIGID CYLINDER 137 CM IN DIAMETER AND 115 CM HIGH. THE TRIAXIAL ANTENNAS WERE 23 M TIP-TO-TIP. ONE 6-M BOOM WAS PROVIDED FOR REMOTE MEASUREMENTS. THE INSTRUMENT PACKAGE HAD A MASS OF 75 KG. POWER WAS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT WAS THREE-AXIS STABILIZED WITH THE YAW AXIS ALIGNED TOWARD THE CENTER OF THE EARTH TO WITHIN 1 DEG. THE SPIN AXIS WAS NORMAL TO THE ORBIT PLANE WITHIN 1 DEG WITH A SPIN RATE OF ONE REVOLUTION PER ORBIT. A SINGLE-AXIS SCAN PLATFORM WAS INCLUDED IN ORDER TO MOUNT THE LOW-ALTITUDE PLASMA INSTRUMENT (P1-070B-00). THE PLATFORM ROTATED ABOUT THE SPIN AXIS. A PCM TELEMETRY DATA SYSTEM WAS USED THAT OPERATED IN REAL TIME OR IN A TAPE-RECORDER MODE. DATA WERE ACQUIRED ON A SCIENCE-PROBLEM-ORIENTED BASIS, WITH CLOSELY COORDINATED OPERATIONS OF THE VARIOUS INSTRUMENTS, BOTH SATELLITES AND SUPPORTIVE EXPERIMENTS. DATA ACQUIRED FROM THE INSTRUMENTS WERE TEMPORARILY STORED ON TAPE RECORDERS BEFORE TRANSMISSION AT AN 8:1 PLAYBACK-TO-RECORD RATIO. SINCE COMMANDS WERE ALSO STORED IN A COMMAND MEMORY UNIT, SPACECRAFT OPERATIONS WERE NOT REAL TIME.

----- DYNAMICS EXPLORER 2, BRACE-----

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- 81-070B-09

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - L.M. BRACE	NASA-GSFC
OI - W.R. HOEY	NASA-GSFC
OI - R.F. THEIS	NASA-GSFC
OI - K.D. COLE	LA TRON U
OI - G.R. CARIGNAN	U OF MICHIGAN

BRIEF DESCRIPTION

THE LANGMUIR PROBE INSTRUMENT (LANG) WAS A CYLINDRICAL ELECTROSTATIC PROBE THAT OBTAINED MEASUREMENTS OF ELECTRON TEMPERATURE, T_e , AND ELECTRON OR ION CONCENTRATION, N_e OR N_i , RESPECTIVELY, DENSITY IRREGULARITIES, AND SPACECRAFT POTENTIAL. DATA FROM THIS INVESTIGATION WERE USED TO PROVIDE TEMPERATURE AND DENSITY MEASUREMENTS ALONG MAGNETIC FIELD LINES RELATED TO THERMAL ENERGY AND PARTICLE FLOWS WITHIN THE MAGNETOSPHERE-IONOSPHERE SYSTEM, TO PROVIDE THERMAL PLASMA CONDITIONS FOR WAVE-PARTICLE INTERACTIONS, AND TO MEASURE LARGE-SCALE AND FINE-STRUCTURE IONOSPHERIC EFFECTS OF ENERGY DEPOSITION IN THE IONOSPHERE. THE LANGMUIR PROBE INSTRUMENT WAS IDENTICAL TO THAT USED ON THE AE SATELLITES AND THE PIONEER VENUS ORBITER. THE INSTRUMENT EMPLOYED TWO INDEPENDENTLY OPERATED CYLINDRICAL COLLECTORS, EACH MOUNTED AT THE END OF A .5 M LONG BOOM. EACH COLLECTOR WAS 5 CM LONG AND 0.3 CM IN DIAMETER. AN ELECTRONIC UNIT APPLIED APPROPRIATE VOLTAGE WAVEFORMS TO EACH PROBE AND MEASURED THE RESULTING CURRENTS THAT WERE DRAWN FROM THE IONOSPHERIC PLASMA SURROUNDING THE SPACECRAFT. THESE CURRENTS WERE INTRODUCED TO CIRCUITS THAT WERE ABLE TO PERFORM AN IN-FLIGHT ANALYSIS OF THE DATA FOR T_e , N_e , AND N_i . THIS GREATLY REDUCED THE REQUIREMENT FOR HIGH TELEMETRY DATA RATES AND PERMITTED INCREASED SPATIAL RESOLUTION OF THE MEASUREMENTS. SPACECRAFT POTENTIAL WAS ALSO DETERMINED FROM THESE MEASUREMENTS. THE INSTRUMENT HAD SELECTABLE MODES OF OPERATION THAT PROVIDED VARIOUS DEGREES OF SPATIAL RESOLUTION. MAXIMUM RESOLUTION FOR N_e OR N_i WAS OBTAINED BY FIRING THE POTENTIAL OF ONE PROBE AND CONTINUOUSLY SAMPLING THE RESULTING RESPECTIVE ELECTRON OR ION CURRENT. THE RESOLUTION WAS LIMITED ONLY BY THE SAMPLING RATE ASSIGNED TO THE INSTRUMENT. SIMULTANEOUSLY, THE OTHER PROBE MEASURED N_i AT A RATE OF UP TO 50 TO 100 PER SECOND, DEPENDING ON THE TELEMETRY RATE AVAILABLE. AT NOMINAL RATES (1000 DPS) T_e AND N_e WERE MEASURED ABOUT ONE OR TWO TIMES PER SECOND. ELECTRON TEMPERATURE WAS MEASURED FROM 500 TO 20,000 DEG K; ELECTRON DENSITY FROM 20 TO 2.0E+6 ELECTRONS PER CUBIC CM; TOTAL ION DENSITY FROM 1.0E+3 TO 1.0E+7 IONS PER CUBIC CM; AND DENSITY IRREGULARITIES WITH 120 M RESOLUTION. SPACECRAFT POTENTIAL WAS MEASURED TO PLUS OR MINUS 5 V.

----- DYNAMICS EXPLORER 2, CARIGNAN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER

NSSDC ID- 81-0700-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.R. CARIGNAN	U OF MICHIGAN
O1 - N.W. SPENCER	NASA-GSFC
O1 - C.A. REBER	NASA-GSFC
O1 - A.E. MEDIN	NASA-GSFC
O1 - B.P. BLOCK	U OF MICHIGAN
O1 - J.C. MAURER	U OF MICHIGAN

BRIEF DESCRIPTION

THE NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (NACS) WAS DESIGNED TO OBTAIN IN SITU MEASUREMENTS OF THE NEUTRAL ATMOSPHERIC COMPOSITION AND TO STUDY THE VARIATIONS OF THE NEUTRAL ATMOSPHERE IN RESPONSE TO ENERGY COUPLED INTO IT FROM THE MAGNETOSPHERE. BECAUSE TEMPERATURE ENHANCEMENTS, LARGE-SCALE CIRCULATION CELLS, AND WAVE PROPAGATION ARE PRODUCED BY ENERGY INPUT (EACH OF WHICH POSSESSES A SPECIFIC SIGNATURE IN COMPOSITION VARIATION), THE MEASUREMENTS PERMITTED THE STUDY OF THE PARTITION, FLOW, AND DEPOSITION OF ENERGY FROM THE MAGNETOSPHERE. THE QUADRUPOLE MASS SPECTROMETER USED WAS A NEARLY IDEAL FOLLOW-ON TO THOSE FLOWN ON THE AE-C, -D, AND -E MISSIONS. THE ELECTRON-IMPACT ION SOURCE WAS USED IN A CLOSED MODE. ATMOSPHERIC PARTICLES ENTERED AN ANTICHAMBER THROUGH A KNIFE-EDGED ORIFICE, WHERE THEY WERE THERMALIZED TO THE INSTRUMENT TEMPERATURE. THE IONS WITH THE SELECTED CHARGE-TO-MASS RATIOS HAD STABLE TRAJECTORIES THROUGH THE HYPERBOLIC ELECTRIC FIELD AND EXITED THE ANALYZER AND ENTER INTO THE DETECTION SYSTEM. AN OFF-AXIS BERYLLIUM-COPPER DYNODE MULTIPLIER OPERATING AT A GAIN OF 2×10^6 PROVIDED AN OUTPUT PULSE OF ELECTRONS FOR EACH ION ARRIVAL. THE DETECTOR OUTPUT HAD A PULSE RATE PROPORTIONAL TO THE NEUTRAL DENSITY IN THE ION SOURCE OF THE SELECTED MASS. THE INSTRUMENT ALSO INCLUDED TWO BAFFLES THAT SCANNED ACROSS THE INPUT ORIFICE FOR OPTIONAL MEASUREMENT OF THE ZONAL AND VERTICAL COMPONENTS OF THE NEUTRAL WIND. THE INSTRUMENT COVERED THE ENTIRE MASS RANGE FROM 1 TO 40 U, BUT NORMALLY WAS USED IN A SELECTED MASS STEPPING MODE WHERE MASS NUMBERS 4, 20, 30, 32, AND 40 WERE SAMPLED SEQUENTIALLY WITH A SPATIAL RESOLUTION OF 4 KM. THE TIME RESOLUTION NEEDED TO DETERMINE THE ABUNDANCE OF GAS AT A SINGLE MASS WAS 16 MILLISECONDS. OPERATIONAL ALTITUDES WERE BETWEEN 200 KM AND 500 KM, WITH REDUCED CAPABILITY AS LOW AS 150 KM AND AS HIGH AS 600 KM. THE NOMINAL INSTRUMENT SENSITIVITY = 6.2×10^{-6} COUNTS PER INTEGRATION PERIOD PER PARTICLE PER CUBIC CM.

----- DYNAMICS EXPLORER 2, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 81-0700-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
ATMOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL

PI - W.B. HANSON	U OF TEXAS, DALLAS
O1 - R.A. MEELIS	U OF TEXAS, DALLAS
O1 - D.R. ZUCCARO	U OF TEXAS, DALLAS
O1 - C.W. LIPPENCOTT	U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE RETARDING POTENTIAL ANALYZER (RPA) PROVIDED DATA ON TEMPERATURE, COMPOSITION, CONCENTRATION, AND THE BULK VELOCITY OF POSITIVE IONS NOMINALLY PARALLEL TO THE VEHICLE VELOCITY. THE MEASURED PARAMETERS OBTAINED FROM THIS INVESTIGATION ARE BASIC TO THE UNDERSTANDING OF MECHANISMS THAT INFLUENCE THE PLASMA; I.E., TO UNDERSTAND THE COUPLING BETWEEN THE SOLAR WIND AND THE EARTH'S ATMOSPHERE. THE ANALYZER DEFINED THE ION TEMPERATURE IN THE REGIONS WHERE THE CONCENTRATION, $N(1)$, WAS GREATER THAN 100 IONS PER CUBIC CM, AND DETERMINED THE VALUE OF $N(1)$ FROM ITS MAXIMUM VALUE DOWN TO APPROXIMATELY 50 IONS PER CUBIC CM. THE RPA PROVIDED THE BEST ABSOLUTE VALUE FOR $N(1)$ OF THE IN SITU MEASURING INSTRUMENTS ON THE SPACECRAFT, AND WAS ALSO CAPABLE OF MEASURING FRACTIONAL CHANGES IN $N(1)$ OF LESS THAN 0.1 PERCENT WITH HIGH SPATIAL RESOLUTION. THE FRACTIONAL CHANGES IN $N(1)$ WERE CALLED THE IRREGULARITY INDEX. THE MEASUREMENTS WERE MADE WITH A MULTIGRIDDED PLANAR RETARDING POTENTIAL ANALYZER VERY SIMILAR IN CONCEPT AND GEOMETRY TO THE INSTRUMENTS CARRIED ON THE AE SATELLITES. THE DUCT SENSOR HAD A SEPARATE APERTURE. A PAIR OF APERTURE GRIDS WERE HELD AT SPACECRAFT GROUND, AND A SECOND PAIR OF GRIDS COMPRISED THE RETARDING SWEEP GRID. THE POTENTIAL ON THESE GRIDS DETERMINED THE ENERGY OF THE IONS IN THE SPACECRAFT FRAME OF REFERENCE THAT REACHED THE ELECTROMETER COLLECTOR. THE RETARDING POTENTIAL WAS VARIED IN DIFFERENT SEQUENCES TO PROVIDE INFORMATION ON THE ION THERMAL ENERGY DISTRIBUTION. THE ELECTRICALLY NEGATIVE SUPPRESSOR GRID BETWEEN THE SWEEP GRID AND THE COLLECTOR SERVED TO SUPPRESS SOLAR UV EJECTED PHOTOELECTRONS BY SENDING THEM BACK TO THE COLLECTOR AND ALSO SHIELDED THE COLLECTOR FROM AMBIENT ELECTRONS. THE ION CURRENT-RETARDING VOLTAGE CHARACTERISTICS WERE ANALYZED BY FITTING THEORETICAL CURVES TO THE DATA ON A COMPUTER USING

LEAST SQUARES TECHNIQUES. PARAMETERS THAT WERE DEDUCED FROM THIS PROCESS WERE ION TEMPERATURE, VEHICLE POTENTIAL, RAM COMPONENT OF THE ION DRIFT VELOCITY, THE ION AND ELECTRON CONCENTRATION IRREGULARITY SPECTRUM, AND THE CONCENTRATION OF H^+ , He^+ , O^+ , AND Fe^+ , AND MOLECULAR IONS OH^+ , NO^+ , AND N_2^+ . THE ION CONCENTRATIONS WERE MEASURED FROM 90 CM-3 TO 3.8×10^6 CM-3. THE RANGE OF THE ION TEMPERATURE MEASUREMENTS EXTENDED FROM 200 DEG K TO 10,000 DEG K. THE IRREGULARITY INDEX RANGED FROM 1.5×10^{-3} TO 1.5×10^{-5} . THE RANGE OF THE RAM COMPONENT OF THE ION DRIFT WAS FROM 0 TO 4 KM/S.

----- DYNAMICS EXPLORER 2, HAYS-----

INVESTIGATION NAME- FABRY-PEROT INTERFEROMETER

NSSDC ID- 81-0700-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS	U OF MICHIGAN
O1 - R.G. ROBLE	NATL CTR FOR ATMOS RES
O1 - G.R. CARIGNAN	U OF MICHIGAN
O1 - A.F. MAGY	U OF MICHIGAN
O1 - D. REES	U COLLEGE LONDON
O1 - T.M. DONAHUE	U OF MICHIGAN

BRIEF DESCRIPTION

THE FABRY-PEROT INTERFEROMETER (FPI) WAS A HIGH-RESOLUTION INSTRUMENT DESIGNED TO MEASURE THE DRIFT AND TEMPERATURE OF NEUTRAL AND IONIC ATOMIC OXYGEN USING THE DOPPLER TECHNIQUE. ZENITH ANGLE SCANNING PROVIDED WIND DETERMINATIONS AT VARIOUS ALTITUDES BELOW THE SPACECRAFT. THE INFORMATION OBTAINED FROM THIS INVESTIGATION WAS USED TO STUDY THE DYNAMIC RESPONSE OF THE THERMOSPHERE TO THE ENERGY SOURCES CAUSED BY MAGNETOSPHERIC ELECTRIC FIELDS AND THE ABSORPTION OF SOLAR ULTRAVIOLET LIGHT IN THE THERMOSPHERE. THE INSTRUMENT WAS BASED ON THE VISIBLE AIRGLOW EXPERIMENT (VAE) USED IN THE AE PROGRAM. THE ADDITION OF A SCANNING MIRROR, THE FABRY-PEROT ETALON, AN IMAGE PLANE DETECTOR, AND A CALIBRATION LAMP WERE THE PRINCIPAL DIFFERENCES. FOUR BAND-PASS FILTERS ISOLATED LINES AT 5577 A, 6300 A, 7319-7330 A, AND THE SPECTRAL CALIBRATION LINE. THE BASIC SENSOR WAS A FLAT-PLATE FABRY-PEROT INTERFEROMETER, WITH A PLATE DIAMETER OF 3.1 CM AND A PLATE SEPARATION OF 1.27 CM. BECAUSE THE FABRY-PEROT PROVIDED ALL THE NEEDED SPECTRAL INFORMATION IN A CONCENTRIC RING PATTERN ON AN IMAGE PLANE, A SINGLE PHOTON-COUNTING IMAGE DETECTOR WAS USED TO ACQUIRE SIMULTANEOUS SPECTRAL INFORMATION. THIS DETECTOR CONSISTED OF A PHOTOCATHODE MICROCHANNEL-PLATE GAIN STAGE AND CONCENTRIC RING ANODES MATCHED TO THE FABRY-PEROT OUTPUT IMAGE. THE RESOLUTION WAS 0.0196 A PER RING, ALLOWING ABSOLUTE MEASUREMENT ACCURACY OF ABOUT 1.4 M/S FOR THE DRIFT VELOCITY OF NEUTRAL ATOMIC OXYGEN. THE HEIGHT RESOLUTION WAS 1 KM.

----- DYNAMICS EXPLORER 2, MEELIS-----

INVESTIGATION NAME- ION DRIFT METER

NSSDC ID- 81-0700-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.A. MEELIS	U OF TEXAS, DALLAS
O1 - W.B. HANSON	U OF TEXAS, DALLAS
O1 - D.R. ZUCCARO	U OF TEXAS, DALLAS
O1 - C.W. LIPPENCOTT	U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE ION DRIFT METER (IDM) MEASURED THE BULK MOTIONS OF THE IONOSPHERIC PLASMA PERPENDICULAR TO THE SATELLITE VELOCITY VECTOR. THE MEASURED PARAMETERS, HORIZONTAL AND VERTICAL ION DRIFT VELOCITIES, HAD A NOMINAL RANGE OF PLUS OR MINUS 4 KM/S. THE ACCURACY OF THE MEASUREMENT WAS DEPENDENT ON S/C ATTITUDE DETERMINATION. THIS INVESTIGATION YIELDED INFORMATION ON (1) THE ION CONVECTION (ELECTRIC FIELD) PATTERN IN THE AURORAL AND POLAR IONOSPHERE; (2) THE FLOW OF PLASMA ALONG MAGNETIC FIELD LINES WITHIN THE PLASMASPHERE, WHICH DETERMINES WHETHER THIS MOTION WAS SIMPLY A BREATHING OF THE PROTONOSPHERE, A REFILLING OF THIS REGION AFTER A STORM, OR AN INTERHEMISPHERIC TRANSPORT OF PLASMA; (3) THE THERMAL ION CONTRIBUTION TO FIELD-ALIGNED ELECTRIC CURRENTS; (4) VELOCITY FIELDS ASSOCIATED WITH SMALL-SCALE PHENOMENA THAT ARE IMPORTANT AT BOTH LOW AND HIGH LATITUDES; AND (5) THE MAGNITUDE AND VARIATION OF THE TOTAL CONCENTRATION ALONG THE ORBITAL FLIGHT PATH. THE ION DRIFT METER MEASURED THE PLASMA MOTION PARALLEL TO THE SENSOR FACE BY USING A GRIDDED COLLIMATOR AND MULTIPLE COLLECTORS TO DETERMINE THE DIRECTION OF ARRIVAL OF THE PLASMA. THE INSTRUMENT GEOMETRY WAS VERY SIMILAR TO THAT USED ON THE AE-S SATELLITE. TWO LOGARITHMIC AMPLIFIERS AND ONE LINEAR DIFFERENCE AMPLIFIER WERE USED WITH THE DRIFT METER. THE LOGARITHMIC AMPLIFIERS WERE CONNECTED TO DIFFERENT PAIRS OF THE COLLECTOR SEGMENTS AND PROVIDED THE INPUT TO THE DIFFERENCE AMPLIFIER. THE OUTPUT FROM THE DIFFERENCE AMPLIFIER WAS PROPORTIONAL TO THE RATIO OF THE CURRENTS TO THE PAIRS OF COLLECTOR SEGMENTS. IF THE DIRECTION OF ARRIVAL OF THE PLASMA WAS NOT NORMAL TO THE SENSOR FACE, THEN THE ION CURRENT WAS ASYMMETRICALLY DISTRIBUTED OVER THE FOUR COLLECTOR SEGMENTS. IN THE ABSENCE OF ANY INTERNAL

ELECTRIC FIELDS OR NEUTRAL WINDS, THE ANGLE OF ARRIVAL OF THE PLASMA AT THE SENSOR FACE WAS DETERMINED SOLELY BY THE ATTITUDE OF THE SENSOR RELATIVE TO THE SPACECRAFT VELOCITY VECTOR. IF THE SPACECRAFT ATTITUDE, VELOCITY, AND THE POSITION OF THE SENSOR ON THE SURFACE ARE ACCURATELY KNOWN, THEN ANY DEVIATION (RECORDED BY THE DRIFT METER) FROM THE EXPECTED ANGLE OF ARRIVAL OF THE PLASMA WAS INTERPRETED IN TERMS OF PLASMA MOTION CAUSED BY ELECTRIC FIELDS OR NEUTRAL WINDS. IN ADDITION TO MEASURING THE ANGLE OF ARRIVAL OF THE PLASMA AT THE SENSOR FACE, IT WAS POSSIBLE TO MONITOR THE TOTAL ION CONCENTRATION BECAUSE THE SUM OF THE CURRENTS TO THE TWO LOGARITHMIC AMPLIFIERS WAS VERY NEARLY PROPORTIONAL TO THIS QUANTITY. THE INSTRUMENT SENSITIVITY WAS 2.0 M/S IF THE VELOCITY WAS LESS THAN 250 M/S, 8.0 M/S IF THE VELOCITY WAS LESS THAN 1 KM/S; AND WAS 320 M/S IF THE VELOCITY WAS LESS THAN 4 KM/S.

----- DYNAMICS EXPLORER 2, HOFFMAN-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION

NSSDC ID- B1-070B-13 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.A. HOFFMAN NASA-GSFC
OI - J.D. WINNINGHAM SOUTHWEST RES INST
OI - D.M. KLUMPAR U OF TEXAS, DALLAS
OI - J.L. BURCH SOUTHWEST RES INST

BRIEF DESCRIPTION
THIS INVESTIGATION USED THE SUPRATHERMAL PARTICLE DISTRIBUTION FUNCTIONS MEASURED BY BOTH THE HIGH (B1-070A-05) AND LOW (B1-070B-08) ALTITUDE PLASMA INSTRUMENTS. THE PURPOSES WERE (1) TO STUDY THE PROPERTIES AND LOCATIONS OF AURORAL ACCELERATION MECHANISMS, (2) TO DETERMINE THE NATURE AND DISTRIBUTION OF ELECTRIC FIELDS PARALLEL TO THE MAGNETIC FIELD, (3) TO IDENTIFY THE CHARGE CARRIERS OF THE MAJOR ELECTRIC CURRENT SYSTEMS COUPLING THE MAGNETOSPHERE AND IONOSPHERE, AND (4) TO DETERMINE RELATIONS BETWEEN THESE QUANTITIES, AND THE CONVECTION ELECTRIC FIELD AND AURORAL LIGHT EMISSION PATTERNS.

----- DYNAMICS EXPLORER 2, MAYNARD-----

INVESTIGATION NAME- ELECTRIC FIELD INVESTIGATIONS

NSSDC ID- B1-070B-02 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. MAYNARD NASA-GSFC
OI - J.P. HEPPNER NASA-GSFC

BRIEF DESCRIPTION
THE VECTOR ELECTRIC FIELD INSTRUMENT (VEFI) USED FLIGHT-PROVEN DOUBLE-PROBE TECHNIQUES WITH 20-M BASELINES TO OBTAIN VECTOR MEASUREMENTS OF DC ELECTRIC FIELDS. THIS ELECTRIC FIELD INVESTIGATION PROVIDED THE DATA NECESSARY TO MEET THE FOLLOWING OBJECTIVES: (1) TO OBTAIN ACCURATE AND COMPREHENSIVE TRIAXIAL DC ELECTRIC FIELD MEASUREMENTS AT IONOSPHERIC ALTITUDES IN ORDER TO REFINE THE BASIC SPATIAL PATTERNS, DEFINE THE LARGE-SCALE TIME HISTORY OF THESE PATTERNS, AND STUDY THE SMALL-SCALE TEMPORAL AND SPATIAL VARIATIONS WITHIN THE OVERALL PATTERNS; (2) TO STUDY THE DEGREE TO WHICH AND IN WHAT REGION THE ELECTRIC FIELD PROJECTS TO THE EQUATORIAL PLANE; (3) TO OBTAIN MEASUREMENTS OF ELF AND LOWER-FREQUENCY IRREGULARITY STRUCTURES; AND (4) TO PERFORM NUMEROUS CORRELATIVE STUDIES. THE INSTRUMENT CONSISTED OF SIX CYLINDRICAL ELEMENTS 11 M LONG AND 28 MM IN DIAMETER. EACH ANTENNA WAS INSULATED FROM THE PLASMA EXCEPT FOR THE OUTER 2 M, THE BASELINE, OR DISTANCE BETWEEN THE MIDPOINTS OF THESE 2-M ACTIVE ELEMENTS, WAS 20 M. THE ANTENNAS WERE INTERLOCKED ALONG THE EDGES TO PREVENT OSCILLATION AND TO INCREASE THEIR RIGIDITY AGAINST DRAG FORCES. THE BASIC ELECTRONIC SYSTEM WAS VERY SIMILAR IN CONCEPT TO THAT USED ON IMP-J AND ISEE 1, BUT MODIFIED FOR A THREE-AXIS MEASUREMENT ON A NONSPINNING SPACECRAFT. AT THE CORE OF THE SYSTEM WERE THE HIGH-IMPEDANCE (1.E12 OHM) PREAMPLIFIERS WHOSE OUTPUTS WERE ACCURATELY SUBTRACTED AND DIGITIZED (14-BIT A-D CONVERSION FOR SENSITIVITY TO 0.1 MICROVOLT/M) TO MAINTAIN HIGH RESOLUTION FOR SUBSEQUENT REMOVAL OF THE CROSS-PRODUCT OF THE VECTORS V AND B IN DATA PROCESSING. THIS PROVIDED THE BASIC DC MEASUREMENT. OTHER CIRCUITRY WAS USED TO AID IN INTERPRETING THE DC DATA AND TO MEASURE RAPID VARIATIONS IN THE SIGNALS DETECTED BY THE ANTENNAS. THE DC ELECTRIC FIELD RANGE WAS PLUS OR MINUS 1 V/M, THE RESOLUTION WAS 0.1 MV/M, AND THE VARIATIONAL ELECTRIC FIELD WAS MEASURED FROM 4 HZ TO 512 HZ. THE D.C. ELECTRIC FIELD WAS MEASURED AT 16 SAMPLES/S. THE VARIATIONAL ELECTRIC FIELD WAS MEASURED FROM 1 MICROVOLT PER M TO 10 MILLIVOLTS PER M RMS.

----- DYNAMICS EXPLORER 2, MAYR-----

INVESTIGATION NAME- ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION

NSSDC ID- B1-070B-12 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - H.G. MAYR NASA-GSFC
OI - G.P. NEWTON NASA HEADQUARTERS

BRIEF DESCRIPTION
THE PURPOSE OF THIS INVESTIGATION WAS TO STUDY THE DYNAMIC RESPONSES OF THE THERMOSPHERE AND IONOSPHERE TO ENERGY DEPOSITION IN THE FORM OF JOULE HEATING, PARTICLE PRECIPITATION, AND MOMENTUM TRANSFER BY ELECTRIC FIELD-GENERATED DRIFTS. THE OBJECTIVE WAS TO DETERMINE THE RELATIVE IMPORTANCE OF THE VARIOUS PHENOMENA AND THE CONDITIONS UNDER WHICH ORDERING OCCURS. BECAUSE THE RELATIVE IMPORTANCE OF THE DIFFERENT PROCESSES VARIED WITH GEOMAGNETIC ACTIVITY, BOTH GEOMAGNETICALLY QUIET AND DISTURBED CONDITIONS WERE EXAMINED. USING THEORETICAL MODELS AS TOOLS, THE PRINCIPAL GOAL WAS TO QUANTITATIVELY ANALYZE THE PHYSICAL PROCESSES INVOLVED IN THE ENERGY COUPLING BETWEEN THE MAGNETOSPHERE AND THE THERMOSPHERE. IN ADDITION TO DATA OBTAINED FROM VARIOUS DE SATELLITE INSTRUMENTS, THE INVESTIGATION USED GROUND-BASED CORRELATIVE MEASUREMENTS.

----- DYNAMICS EXPLORER 2, NAGY-----

INVESTIGATION NAME- MAGNETOSPHERIC ENERGY COUPLING TO THE ATMOSPHERE INVESTIGATION

NSSDC ID- B1-070B-10 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - A.F. NAGY U OF MICHIGAN

BRIEF DESCRIPTION
THIS INVESTIGATION, USED VARIOUS DATA FROM VARIOUS SPACECRAFT INSTRUMENTS TO STUDY THE FOLLOWING: (1) GLOBAL THERMOSPHERIC DYNAMICS (THE EFFECTS OF ENERGY INPUT TO THE THERMOSPHERE FROM THE MAGNETOSPHERE BY CONVECTION, JOULE HEATING, PARTICLE PRECIPITATION AND TIDAL ENERGY), (2) THE CONVECTIVE COUPLING OF THE THERMAL PLASMA BETWEEN THE IONOSPHERE AND MAGNETOSPHERE; AND (3) THE ENERGY-LOSS MECHANISMS OF IONOSPHERIC PHOTOELECTRONS IN THE PLASMASPHERE.

----- DYNAMICS EXPLORER 2, ROBLE-----

INVESTIGATION NAME- NEUTRAL-PLASMA INTERACTIONS INVESTIGATION

NSSDC ID- B1-070B-11 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - H.G. ROBLE NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
THIS INVESTIGATION, USED DATA FROM VARIOUS SPACECRAFT INSTRUMENTS TO STUDY THE LARGE-SCALE NEUTRAL-PLASMA INTERACTIONS IN THE THERMOSPHERE CAUSED BY MAGNETOSPHERIC-IONOSPHERIC AND THERMOSPHERIC COUPLING PROCESSES. MODELS WERE USED TO PROVIDE A THEORETICAL FRAMEWORK IN WHICH CERTAIN IMPORTANT IONOSPHERIC AND ATMOSPHERIC PROPERTIES NEEDED FOR COUPLING PROCESSES (SUCH AS THE PEDERSEN AND HALL CONDUCTIVITIES) WERE CONSISTENTLY CALCULATED USING SATELLITE DATA MEASURED AT A GIVEN HEIGHT. THESE MODELS WERE USED TO CALCULATE VERTICAL PROFILES OF IONOSPHERIC PROPERTIES THAT WERE USEFUL FOR COMPARISON WITH INCOHERENT SCATTER RADAR MEASUREMENTS AND OTHER GROUND-BASED SUPPORTING DATA. THE DATA WERE USED TO IDENTIFY AND EVALUATE THE NEUTRAL THERMOSPHERIC HEAT AND MOMENTUM SOURCES, AND TO DETERMINE THE EFFECTIVENESS OF HIGH-LATITUDE DYNAMIC PROCESSES IN CONTROLLING THE GLOBAL THERMOSPHERIC CIRCULATION AND THERMAL STRUCTURE.

----- DYNAMICS EXPLORER 2, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE SPECTROMETER

NSSDC ID- B1-070B-04 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M.W. SPENCER
 OI - A.E. MEDIN
 OI - H.R. NIEMANN
 OI - G.R. CARRIGAN
 OI - L.E. WHARTON
 OI - J.C. MAURER

NASA-GSFC
 NASA-GSFC
 NASA-GSFC
 U OF MICHIGAN
 NASA-GSFC
 U OF MICHIGAN

BRIEF DESCRIPTION

THE WIND AND TEMPERATURE SPECTROMETER (WATS) MEASURED THE IN SITU NEUTRAL WINDS, THE NEUTRAL PARTICLE TEMPERATURES, AND THE CONCENTRATIONS OF SELECTED GASES. THE OBJECTIVE OF THIS INVESTIGATION WAS TO STUDY THE INTERRELATIONSHIPS AMONG THE WINDS, TEMPERATURES, PLASMA DRIFT, ELECTRIC FIELDS, AND OTHER PROPERTIES OF THE THERMOSPHERE THAT WERE MEASURED BY OTHER INSTRUMENTS ON THE SPACECRAFT. KNOWLEDGE OF HOW THESE PROPERTIES ARE INTERRELATED HELPED IN EXPLAINING THE CONSEQUENCES OF THE ACCELERATION OF NEUTRAL PARTICLES BY THE IONS IN THE IONOSPHERE, THE ACCELERATION OF IONS BY NEUTRALS CREATING ELECTRIC FIELDS, AND THE RELATED ENERGY TRANSFER BETWEEN THE IONOSPHERE AND THE MAGNETOSPHERE. THREE COMPONENTS OF THE WIND, ONE NORMAL TO THE SATELLITE VELOCITY VECTOR IN THE HORIZONTAL PLANE, ONE VERTICAL, AND ONE IN THE SATELLITE DIRECTION WERE MEASURED. A RETARDING POTENTIAL QUADRUPOLE MASS SPECTROMETER, COUPLED TO THE ATMOSPHERE THROUGH A PRECISELY ORIFICED ANTECHAMBER, WAS USED. IT WAS OPERATED IN EITHER OF TWO MODES, ONE EMPLOYED THE RETARDING CAPABILITY AND THE OTHER USED THE ION SOURCE AS A CONVENTIONAL NONRETARDING SOURCE. TWO SCANNING WAFFLES WERE USED IN FRONT OF THE MASS SPECTROMETER, ONE MOVED VERTICALLY IN FRONT OF THE SENSOR AND ONE MOVED HORIZONTALLY. THE MAGNITUDES OF THE HORIZONTAL AND VERTICAL COMPONENTS OF THE WIND NORMAL TO THE SPACECRAFT VELOCITY VECTOR WERE COMPUTED FROM MEASUREMENTS OF THE ANGULAR RELATIONSHIP BETWEEN THE NEUTRAL PARTICLE STREAM AND THE SENSOR. THE COMPONENT OF THE TOTAL STREAM VELOCITY IN THE SATELLITE DIRECTION WAS MEASURED DIRECTLY BY THE SPECTROMETER SYSTEM THROUGH DETERMINATION OF THE REQUIRED RETARDING POTENTIAL. AT ALTITUDES TOO HIGH FOR NEUTRAL SPECIES MEASUREMENTS, THE INSTRUMENT OPERATED TO MEASURE THE THERMAL ION SPECIES ONLY. THE MEASURED WIND VELOCITY RANGED FROM 10 M/S TO 1500 M/S. THE MEASURED IN SITU NEUTRAL GAS TEMPERATURE, BASED ON MEASUREMENTS OF NEUTRAL MOLECULAR NITROGEN AND ATOMIC OXYGEN, RANGED FROM 400 TO 2000 DEG K.

----- DYNAMICS EXPLORER 2, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD OBSERVATIONS

NSSDC ID- B1-0700-01

INVESTIGATIVE PROGRAM
 CODE 57

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 ATMOSPHERIC PHYSICS

PERSONNEL

PI - M. SUGIURA
 OI - M.G. LEDLEY
 OI - J.W. FARTHING
 OI - L.J. CAMILL, JR.

NASA-GSFC
 NASA-GSFC
 NASA-GSFC
 U OF MINNESOTA

BRIEF DESCRIPTION

A FLURGATE MAGNETOMETER (MAG-B) SIMILAR TO ONE ON BOARD DE 1 (B1-0700-01), WAS USED TO OBTAIN MAGNETIC FIELD DATA NEEDED TO STUDY THE MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE COUPLING. THE PRIMARY OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE FIELD-ALIGNED CURRENTS IN THE AURORAL OVAL AND OVER THE POLAR CAP AT TWO DIFFERENT ALTITUDES USING THE TWO SPACECRAFT, AND TO CORRELATE THESE MEASUREMENTS WITH OBSERVATIONS OF ELECTRIC FIELDS, PLASMA WAVES, SUPRATHERMAL PARTICLES, THERMAL PARTICLES, AND AURORAL IMAGES OBTAINED FROM INVESTIGATION B1-0700-05. THE SENSOR WAS A THREE-AXIS FLURGATE MAGNETOMETER WITH DIGITAL COMPENSATION OF THE AMBIENT FIELD IN PRECISE 8.13-NT (8.13-GAMMA) INCREMENTS. THE INSTRUMENT INCORPORATED ITS OWN 12-BIT A-D CONVERTER, 4-BIT DIGITAL COMPENSATION REGISTER FOR EACH AXIS, AND A SYSTEM CONTROL THAT GENERATED A 48-BIT DATA WORD CONSISTING OF A 16-BIT REPRESENTATION OF THE FIELD MEASURED ALONG EACH OF THREE MAGNETOMETER AXES. TRACK AND HOLD MODULES WERE USED TO OBTAIN SIMULTANEOUS SAMPLES ON ALL THREE AXES. THE INSTRUMENT BANDWIDTH WAS 25 HZ. THE ANALOG RANGE WAS PLUS OR MINUS 60,000 NT. THE ACCURACY WAS 4 NT, AND THE RESOLUTION WAS 1.5 NT.

----- DYNAMICS EXPLORER 2, WINNINGHAM-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INSTRUMENT

NSSDC ID- B1-0700-08

INVESTIGATIVE PROGRAM
 CODE 57

INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 PARTICLES AND FIELDS
 IONOSPHERES

PERSONNEL

PI - J.D. WINNINGHAM
 OI - D.M. KLUMPAR
 OI - R.A. MOFFMAN
 OI - J.L. BURCH

SOUTHWEST RES INST
 U OF TEXAS, DALLAS
 NASA-GSFC
 SOUTHWEST RES INST

BRIEF DESCRIPTION

THE LOW-ALTITUDE PLASMA INSTRUMENT (LAPI) PROVIDED HIGH-RESOLUTION MEASUREMENTS OF POSITIVE IONS AND ELECTRONS FROM 5 EV TO 30 KEV, WITH AN ENERGY RESOLUTION $\Delta E/E$ EQUAL TO 32 PERCENT. THE FLUX RANGE VARIED FROM 2.0E8 SUB ZERO TO MINUS 1 POWER TO 5.11E8 SUB ZERO TO MINUS 1 POWER (PARTICLES/SEC CM²/SR/DEG). DATA FROM THIS INVESTIGATION AND SUPPORTING MEASUREMENTS WERE USED TO STUDY (1) THE IDENTIFICATION AND INTENSITIES OF BIRKELAND CURRENTS, (2) AURORAL PARTICLE SOURCE REGIONS AND ACCELERATION MECHANISMS, (3) THE EXISTENCE AND ROLE OF E PARALLEL TO B, (4) SOURCES AND EFFECTS OF POLAR CAP PARTICLE FLUXES, (5) THE TRANSPORT OF PLASMA WITHIN AND THROUGH THE MAGNETOSPHERIC CURPS, (6) DYNAMIC CONFIGURATIONS OF HIGH-LATITUDE FLUX TUBES, (7) LOSS-CONE EFFECTS OF WAVE-PARTICLE INTERACTIONS, (8) HOT-COLD PLASMA INTERACTIONS, (9) IONOSPHERIC EFFECTS OF PARTICLE PRECIPITATION, AND (10) PLASMA CONVECTION AT HIGH ALTITUDES. THE INSTRUMENT CONTAINED AN ARRAY OF 16 ELECTROSTATIC ANALYZERS OF THE 1515 2 TYPE, EACH WITH AN ELECTRON CHANNEL AND AN ION CHANNEL, IN ORDER TO OBTAIN DETAILED PITCH-ANGLE DISTRIBUTIONS AS A FUNCTION OF ENERGY. THE BASIC MODE OF OPERATION PROVIDED A 32-POINT ENERGY SPECTRUM EVERY SECOND FROM EACH SENSOR, BUT THE VOLTAGES ON THE ELECTROSTATIC ANALYZERS WERE PROGRAMMABLE TO ALLOW FOR HIGHER TIME RESOLUTION OVER LIMITED PORTIONS OF THE ENERGY SPECTRUM. THE INSTRUMENT WAS MOUNTED ON A ONE-AXIS SCAN PLATFORM ORIENTED SO THAT ONE DETECTOR WAS ALWAYS MEASURING PARTICLES WITH PITCH ANGLES OF LESS THAN 1 DEG.

***** ESA-GEOS 2*****

SPACECRAFT COMMON NAME- ESA-GEOS 2
 ALTERNATE NAMES- 10901

NSSDC ID- 78-071A

LAUNCH DATE- 07/14/78 WEIGHT- 273.6 KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
 INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 1431.2 MIN
 PERIAPSIS- 35615.5 KM ALT

EPOCH DATE- 08/06/78
 INCLINATION- 0.772 DEG
 APOAPSIS- 35741.1 KM ALT

PERSONNEL

PM - D.E. MULLINGER
 PS - K. KNOTT

ESA-ESTEC
 ESA-ESTEC

BRIEF DESCRIPTION

ESA-GEOS 2 WAS THE FIRST SPACECRAFT PLACED IN AN EQUATORIAL GEOSTATIONARY ORBIT DEDICATED COMPLETELY TO SCIENTIFIC MEASUREMENTS. THE SPACECRAFT SERVED AS A CORE OR REFERENCE SPACECRAFT FOR THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) AND CARRIED OUT CORRELATIVE MEASUREMENTS WITH EXTENSIVE GROUND-BASED NETWORKS IN SCANDINAVIA. THE PAYLOAD CONSISTED OF INSTRUMENTS TO MEASURE (1) DC AND AC ELECTRIC AND MAGNETIC FIELDS; (2) GRADIENT OF THE MAGNETIC FIELDS; (3) THERMAL AND SUPRATHERMAL PLASMA PARALLEL AND PERPENDICULAR TO THE MAGNETIC FIELD; (4) ENERGY SPECTRA, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS; AND (5) ANGULAR DISTRIBUTION AND ENERGY SPECTRA OF ENERGETIC ELECTRONS AND IONS. THE SPACECRAFT WAS CYLINDRICAL WITH A HEIGHT OF 1.32 M. THE TOTAL MASS, EXCLUDING PROPELLANTS, WAS 273.6 KG. THERE WERE FOUR TELESCOPIC AN AL BOOMS 2.5 M IN LENGTH FOR THE WISHED WIRE SPHERES OF AN AC ELECTRIC FIELD EXPERIMENT, TWO 20-M CABLE BOOMS FOR MAGNETIC AND ELECTRIC FIELD SENSORS AND FOR AN EXCITATION ANTENNA FOR PLASMA RESONANCES, AND TWO LOCKING RADIANT BOOMS 3 M IN LENGTH FOR A VARIETY OF INSTRUMENTS. THERE WERE SIX HYDRAZINE THRUSTERS, TWO TO TILT AND PRECESS THE SPACECRAFT, TWO TO MODIFY THE ORBIT SO THE LONGITUDE OF THE APOGEE COULD BE CHANGED, AND TWO FOR SPIN UP AND SPIN DOWN. THE SPIN RATE WAS NOMINALLY 10 RPM. DATA WERE TELEMETTERED IN REAL TIME AT 137.2 MHZ (106 AND 744 BPS) AND AT 2299.5 MHZ (11.91 OR 95.25 KDS). ALTITUDE MEASUREMENTS WERE OBTAINED BY A SUN SENSOR, A DUAL INFRARED EARTH SENSOR, AND ACCELEROMETERS. POWER WAS SUPPLIED BY 7200 SOLAR CELLS MOUNTED ON THE SPACECRAFT SURFACE. TO PREVENT SPACECRAFT DIFFERENTIAL CHARGING, 96 PERCENT OF THE SURFACE WAS ELECTRICALLY CONDUCTIVE. BECAUSE OF THE IMPORTANCE OF THE MAGNETIC FIELD MEASUREMENTS, THE SPACECRAFT RESIDUAL FIELD AT THE MAGNETOMETER IS ONLY 0.3 NT (GAMMAS). EXCEPT FOR MINOR MODIFICATIONS TO CERTAIN EXPERIMENTS, THIS SPACECRAFT AND INSTRUMENTS WERE IDENTICAL TO ESA-GEOS 1 (77-029A), AND MORE DETAILED INFORMATION CAN BE FOUND IN 'ESA BULLETIN' NO. 9 MAY 1977. ONE SOLAR PANEL DEVELOPED A SHORT CIRCUIT SOON AFTER LAUNCH AND A NUMBER OF THE EXPERIMENTS COULD OBTAIN USEFUL DATA ONLY FOR ONE HALF OF THE SPIN PERIOD.

----- ESA-GEOS 2, BEGHIN-----

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSSDC ID- 78-071A-11

INVESTIGATIVE PROGRAM
 SCIENCE

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - C. BEGHIN CNRS, CTR FOR SPECTROM

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF ESA EXPERIMENT NO. S-300 AND MADE USE OF ONE SET OF MESHED ELECTRIC SPHERES MOUNTED ON THE END OF THE AXIAL BOOMS (PART OF 78-071A-10, UNGSTRUP) AND THE TWO VITREOUS CARBON SPHERES MOUNTED ON THE END OF THE 20-M RADIAL BOOMS (78-071A-07, PEDERSEN). THE MESHED SPHERES WERE USED AS TRANSMITTING ELEMENTS FOR FREQUENCIES FROM 0.2 TO 76 KHZ. THE SELF-IMPEDANCE OF THESE SPHERES AND THE MUTUAL IMPEDANCE BETWEEN THE MESHED AND LONG-BOOM CARBON SPHERES WERE MEASURED. STRONG RESONANCES AT THE HYBRID RESONANCE FREQUENCIES AND ANTI-RESONANCES AT THE CYRO FREQUENCIES WERE USED TO DETERMINE THE DENSITY OF THE SURROUNDING PLASMA. FREQUENCIES UP TO 400 HZ WERE TELEMETERED DIRECTLY, AND SWEPT-FREQUENCY ANALYZERS AND DIGITAL CORRELATION WERE EMPLOYED TO OBTAIN THE AUTO- AND/OR CROSS-CORRELATION UP TO 77 KHZ WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ.

----- ESA-GEOS 2, GEISS -----

INVESTIGATION NAME- LOW-ENERGY ION COMPOSITION

NSSDC ID- 78-071A-03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J. GEISS	U OF BERNE
PI - M.R. ROSENBAUER	RPI-AERONOMY
OI - P.X. EBERHARDT	U OF BERNE
OI - M. BALTIGER	U OF BERNE
OI - A. GHISETTI	U OF BERNE
OI - M. LOIDL	RPI-EXTRATERM PHYS
OI - D.T. YOUNG	U OF BERNE

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXP: IMENT NO. S-303) MEASURED THE ENERGY, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS USING A CYLINDRICAL ELECTROSTATIC ANALYZER (ESA) FOLLOWED BY A CROSSED ELECTRIC AND MAGNETIC FIELD ANALYZER (CFA) TO SELECT THE ENERGY AND VELOCITY. THE ENERGY (PER UNIT CHARGE) RANGED FROM 0.001 TO 17.2 KEV IN 32 STEPS WITH A DELTA E/E OF 0.03 AND A MASS RANGE OF 1 TO 140 U IN 64 LOGARITHMICALLY SPACED STEPS. THERE WAS A THERMAL MODE IN WHICH A RETARDING GRID IN THE ENTRANCE SLIT WAS USED FOR ANALYSIS BELOW 0.1 KEV. ALL PARTICLES THAT OVERCAME THIS GRID VOLTAGE WERE ACCELERATED TO 3 KEV BEFORE ENTERING THE ESA IN ITS LOWEST ENERGY STEP, WHERE BOTH THE ESA AND CFA WERE TRANSPARENT. THE DEVICE VIEWED PERPENDICULAR TO THE SPIN OR Z AXIS. FOR LOW-ENERGY IONS, THE ACCEPTANCE ANGLES WERE PLUS OR MINUS 6 DEG IN AZIMUTH AND PLUS OR MINUS 30 DEG IN ELEVATION (REFERENCED TO THE Z AXIS). FOR THE HIGHEST ENERGIES, THESE ANGLES DECREASED TO 3.5 AND 7.1 DEG, RESPECTIVELY. THREE PERCENT OF THE IONS LEAVING THE ESA WERE COUNTED BY A CHANNELTRON. THE REMAINING 97 PERCENT ENTERED THE CFA AND THE OUTPUT WAS DETECTED BY AN ELECTRON MULTIPLIER. THIS SIGNAL WAS PULSE-HEIGHT ANALYZED BY ONE FIXED AND ONE VARIABLE DISCRIMINATOR TO OBTAIN BETTER MASS DISCRIMINATION. THE MAIN PURPOSE OF THIS INVESTIGATION WAS TO IDENTIFY THE SOURCES OF LOW-ENERGY PARTICLES IN THE MAGNETOSPHERE. TIME VARIATIONS OF THE HELIUM/HYDROGEN RATIO, THE DEGREE OF IONIZATION OF HELIUM AND OXYGEN, AND THE ISOTOPIC ABUNDANCE RATIO OF HELIUM 3/HELIUM 4 COULD BE MEASURED TO DETERMINE THESE SOURCES.

----- ESA-GEOS 2, GENDRIN -----

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSSDC ID- 78-071A-06

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. GENDRIN	CNET
OI - J.M. ETCHEY	CNET
OI - E. UNGSTRUP	DANISH SPACE RES INST

BRIEF DESCRIPTION

THE INSTRUMENT USED TWO SETS OF THREE-AXIS SEARCH COIL MAGNETOMETERS, ONE FOR THE ULF/ELF RANGE (0.1 TO 450 HZ) AND ONE FOR THE VLF RANGE (0.3 TO 30 KHZ). EACH SEARCH COIL CONSISTED OF A HIGH-PERMEABILITY MATERIAL WITH A HIGH-DENSITY PICK-UP WINDING. EACH SET OF THE THREE COILS WAS BUILT INTO A SINGLE ASSEMBLY AND MOUNTED ON THE LOCKING 3-M BOOMS AT A DISTANCE OF 2 M FROM THE SPACECRAFT. TYPICAL SENSITIVITIES OF THESE SENSORS IN UNITS OF GAMMAS PER SQ ROOT OF HZ, WERE 1.E-1 AT 0.1 HZ, 2.E-4 AT 10 HZ, AND ABOUT 3.E-6 AT 1 KHZ. THESE SENSORS AND SOME ASSOCIATED ELECTRONICS CONSISTING OF (1) A LARGE NUMBER OF CHANNEL-SELECTION SWITCHES, (2) A NUMBER OF BANDPASS FILTERS, (3) SIX SWEPT-FREQUENCY ANALYZERS (SFA), (4) A DIGITAL CORRELATOR, AND (5) EIGHT STEPPED-GAIN AMPLIFIERS, WERE A PART OF THE ESA WAVE EXPERIMENT NO. S-300. THESE COMPONENTS WERE EMPLOYED FOR THE SENSORS DESCRIBED IN 78-071A-07 (PEDERSEN) AND -10 (UNGSTRUP), AND ALSO THE INVESTIGATIONS DESCRIBED IN -05 (PETIT) AND -11 (BEGHIN). SIX ANALOG CHANNELS OF 450 HZ BANDWIDTH AND THE DIGITAL CORRELATOR

OUTPUT WERE TRANSMITTED BY THE 95.25 KHZ TELEMETRY MODE. THE SFAS COVERED THE FREQUENCY RANGE UP TO 77 KHZ IN 200 PARTLY OVERLAPPING STEPS. THE CORRELATOR PROVIDED AN AUTO-CORRELOGRAM OF 128 POINTS WITHIN 29 MS. ITS BANDWIDTH COULD BE SELECTED TO BE 2.5, 5.0, OR 10.0 KHZ. A CROSS-CORRELOGRAM BETWEEN TWO SENSORS COULD BE PROVIDED. THE CORRELATOR ALSO OPERATED IN A TIME-SHARING MODE BETWEEN AUTO- AND CROSS-CORRELATION.

----- ESA-GEOS 2, MULTIVIST -----

INVESTIGATION NAME- LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION

NSSDC ID- 78-071A-04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.K.G. MULTIVIST	KIRUNA GEOPHYS INST
OI - M. BORG	KIRUNA GEOPHYS INST
OI - L.A. HOLMGREN	KIRUNA GEOPHYS INST

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-310) MEASURED THE ENERGY AND PITCH-ANGLE DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 0.2 TO 20 KEV WITH EXTENSIVE ANGULAR COVERAGE CONCENTRATED IN THE LOSS-CONE REGION. THE PURPOSE OF THE INVESTIGATION WAS TO IMPROVE THE UNDERSTANDING OF AURORAL PARTICLE ACCELERATION AND PRECIPITATION MECHANISMS BY COMPARING NEAR-EQUATORIAL PARTICLE DISTRIBUTIONS WITH COORDINATED GROUND-BASED OBSERVATIONS AT THE FOOT OF THE MAGNETIC FIELD LINE. HIGH TEMPORAL AND SPATIAL RESOLUTION OF THE INSTRUMENT WAS PROVIDED TO STUDY WAVE-PARTICLE INTERACTIONS. THE EXPERIMENT OF MILKEN (78-071A-01) WAS COMPLEMENTARY TO THIS ONE, EXTENDING TO HIGH ENERGY RANGES BOTH ELECTRON AND PROTON OBSERVATIONS. A TOTAL OF 18 CURVED-PLATE ANALYZERS WITH CHANNEL ELECTRON MULTIPLIERS FOR PARTICLE DETECTION WAS USED. ALTHOUGH NORMALLY EIGHT ANALYZERS WERE USED TO DETECT ELECTRONS AND TWO TO DETECT PROTONS, A COMPLEX ARRANGEMENT WITH FOUR SEPARATE HV SUPPLIES ALLOWED INDEPENDENT SWITCHING OF FOUR DETECTOR GROUPS. THE ANALYZING PLATE VOLTAGES COULD OPERATE IN A STEPPING MODE, A SWEEPING MODE, OR A CONSTANT-VOLTAGE MODE. IN ADDITION, THE TIME ACCUMULATION COULD BE VARIED WITH A NOMINAL FRAME DURATION OF 43 MS. HOWEVER, THIS DURATION COULD BE DECREASED BY A FACTOR OF FOUR AT THE EXPENSE OF OBTAINING DATA FROM CERTAIN DETECTORS IN THOSE CASES WHERE FAST TEMPORAL VARIATIONS WERE ENCOUNTERED IN THE LOSS CONE. THE ENERGY INTERVALS IN THE STEPPING MODE CONSISTED OF 32 ENERGY STEPS. THE EIGHT NORMAL ELECTRON ANALYZERS, WITH GEOMETRIC FACTOR (G) OF 3.E-4 SQ CM-SR, CONSISTED OF FOUR NARROW-ANGLE (2 DEG X 2 DEG, DELTA E/E OF 0.11) AND FOUR WIDE-ANGLE (8 DEG X 7.5 DEG, DELTA E/E OF 0.09) DEVICES. THE TWO NORMAL PROTON ANALYZERS HAD DELTA E/E OF 0.13, APERTURE OF 6 DEG X 3 DEG, AND G OF 1.E-3 SQ CM-SR. APERTURE ANGULAR WIDTHS REFER TO ELEVATION AND AZIMUTH, RESPECTIVELY, IN RELATION TO THE SPACECRAFT SPIN AXIS. THIS EXPERIMENT RELIED HEAVILY ON REAL-TIME GROUND COMPUTER CONTROL.

----- ESA-GEOS 2, MARIANI -----

INVESTIGATION NAME- TRIAXIAL FLURGATE MAGNETOMETER

NSSDC ID- 78-071A-09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MARIANI	U OF ROME
OI - M. CANDI	CNR, SPACE PLASMA LAB
OI - D.M. FAIRFIELD	NASA-GSFC

BRIEF DESCRIPTION

A TRIAXIAL FLURGATE MAGNETOMETER WAS EMPLOYED FOR SIMULTANEOUS MEASUREMENTS OF THE THREE COMPONENTS OF THE MAGNETIC FIELD. THE FREQUENCY RANGE COVERED BY THE INSTRUMENT EXTENDED FROM DC UP TO 5 HZ. IN THE NORMAL ORIENTATION OF THE SATELLITE, THE MAIN COMPONENT OF THE FIELD COINCIDED WITH THE Z-AXIS OF THE INSTRUMENT, WHICH WAS ALIGNED WITH THE SPIN AXIS OF THE SATELLITE. THE EXPERIMENT HAD BEEN DESIGNED WITH TWO SENSITIVITY RANGES FOR THE X AND Y COMPONENTS, FOR WHICH THE MAGNETIC FIELD COMPONENT WAS ONLY A FRACTION OF THE TOTAL FIELD AND WAS MODULATED BY THE ROTATION OF THE SPACECRAFT. THIS LAST FEATURE MADE THE RANGE SWITCH TECHNIQUE PREFERABLE TO A BIAS OFFSET TECHNIQUE. THE TWO SELECTED SENSITIVITY RANGES WERE PLUS OR MINUS 60 NT (GAMMAS) AND PLUS OR MINUS 100 NT, RESPECTIVELY, IN Z-AXIS, WHERE THE FIELD WAS HIGHER AND NOT MODULATED BY THE SATELLITE ROTATION. A SINGLE SENSITIVITY RANGE OF PLUS OR MINUS 50 NT WAS USED. THE SIGNAL WAS KEPT WITHIN RANGE BY SUPERIMPOSING POSITIVE AND NEGATIVE BIAS LEVELS OF 60 NT EACH, SUCH THAT A RANGE PLUS OR MINUS 400 NT WITH A CONSTANT QUANTIZATION ERROR OF PLUS OR MINUS 0.125 NT USING A 4-BIT DIGITIZATION WAS OBTAINED. THE NOISE LEVEL OF THE SENSORS WAS COMPANABLE TO THIS QUANTIZATION ERROR.

----- ESA-GEOS 2, MELZNER-----

INVESTIGATION NAME- DC ELECTRIC FIELD AND GRADIENT &
ELECTRON BEAM DEFLECTION

NSSDC ID- 78-071A-08

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MELZNER
OI - H. VOLK
OI - G. RETZNER

RPI-EXTRATERM PHYS
RPI-NUCLEAR PHYS
RPI-EXTRATERM PHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS INVESTIGATION (ESA EXPERIMENT NO. 5-329) WAS THE MEASUREMENT OF THE DC ELECTRIC FIELD IN THE PLANE PERPENDICULAR TO THE LOCAL MAGNETIC FIELD (B). THE INVESTIGATION ALSO MEASURED THE SPATIAL GRADIENT OF B IN THE VICINITY OF THE SPACECRAFT. WITH THESE DATA, A MAPPING OF THE ELECTRIC FIELDS IN THE EQUATORIAL MAGNETOSPHERE LINKED PHOTONICALLY TO THE AURORAL ZONES COULD BE ACHIEVED, AS WELL AS DETERMINING PLASMA CONVECTION AND PARTICLE FLOW WITHIN THE PLASMA SHEET. THE INSTRUMENT CONSISTED OF FOUR ELECTRON GUNS SPACED LOGARITHMICALLY FROM THE ELECTRON DETECTOR. TWO OF THE GUNS WERE MOUNTED ON ONE OF THE 3-M RADIAL BOOMS. THE GUNS WERE USED ONE AT A TIME TO GENERATE AN ELECTRON BEAM OF ABOUT 1.E-6 AMP AND ENERGY ABOUT 1 KEV. BOTH PARAMETERS WERE VARIED BY TELECOMMAND. DEFLECTION PLATES ASSOCIATED WITH EACH GUN RECEIVED A SINUSOIDAL SIGNAL FROM THE MAGNETOMETER INVESTIGATION TO ENSURE THAT THE BEAM WAS ALWAYS AT RIGHT ANGLES TO B. IN SPITE OF THE ANGLE OF THE SPIN VECTOR TO B. THE ELECTRON DETECTOR CONSISTED OF DEFLECTION PLATES THAT REMOVED THE ELEVATION CORRECTION GIVEN TO THE BEAM BY THE MAGNETOMETER SIGNAL, A CURVED PLATE ENERGY FILTER, AND A PHOTOMULTIPLIER TUBE. BECAUSE THE MAXIMUM DISPLACEMENT OCCURRED WHEN THE BEAM MADE AN ANGLE OF 0 OR 180 DEG TO THE ELECTRIC FIELD, ALL POSSIBLE DISPLACEMENTS LESS THAN THIS OCCURRED TWICE DURING A SPIN PERIOD. CONSEQUENTLY, THE BEAM SWEEP ACROSS THE DETECTOR TWICE PER SPIN PERIOD, PROVIDED THE MAXIMUM DISPLACEMENT WAS LESS THAN THE DISTANCE BETWEEN THE GUN AND THE DETECTOR. THE VALUES OF THE SPIN ANGLE AT WHICH THE BEAM WAS DETECTED AFTER ONE ORATION, AND THE DISTANCE BETWEEN THE GUN AND RECEIVER, ALLOWED THE DETERMINATION OF THE ELECTRIC FIELD. A POSSIBLE CONTRIBUTION FROM THE GRADIENT OF B COULD BE DETERMINED BY VARYING THE ENERGY OF THE BEAM. THE INVESTIGATION RELIED ENTIRELY ON REAL-TIME CONTROL BY A GROUND-BASED COMPUTER. IT HAD FOUR BASIC MODES OF OPERATION: SEARCH, ADJUSTMENT, OPTIMIZATION, AND NORMAL. THE SEARCH MODE WAS DESIGNED TO FIND THE SIGNAL AT NOMINAL BEAM PARAMETERS. IF THIS WAS NOT ACHIEVED, THE ADJUSTMENT MODE WAS USED TO VARY THESE PARAMETERS SYSTEMATICALLY. ONCE THE BEAM WAS DETECTED, THE OPTIMIZATION MODE DETERMINED THE BEST COMPROMISE BETWEEN BEAM CURRENT AND RECEIVED SIGNAL QUALITY. THEN THE NORMAL MODE STARTED, WHICH CONSISTED OF A CONTINUOUS MEASUREMENT OF THE ELECTRIC FIELD AND THE GRADIENT OF B. USING THE MOST APPROPRIATE OF THE FOUR GUNS. TUNGSTEN FILAMENTS WERE USED IN THE ELECTRON GUN AND THE PROBLEMS CAUSED BY THE BARIUM OXIDE FILAMENTS ON ESA-GEOS 1 WERE NOT EXPERIENCED.

----- ESA-GEOS 2, PEDERSEN-----

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 78-071A-07

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - A. PEDERSEN
OI - D. JONES
OI - K. SNOTT
OI - R.J.L. GARD

ESA-ESTEC
BRITISH ANTARCTIC SURV
ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTED OF TWO VITREOUS CARBON SPHERES MOUNTED AT THE TIPS OF THE 20-M RADIAL BOOMS, WHICH EXTENDED RADially FROM THE SPACECRAFT PERPENDICULAR TO THE SPIN AXIS, AND COMPRISED PART OF THE ESA NO. 5-321 WAVE EXPERIMENT. THIS INVESTIGATION WAS CONCERNED WITH THE DC SINGLE AXIS ELECTRIC FIELD ANALYSIS. THE TWO OUTPUT SIGNALS WERE EVALUATED IN TERMS OF DC ELECTRIC FIELD AND CONDITIONED FOR FURTHER TREATMENT IN THE ANALYSIS OF AC ELECTRIC FIELDS. THE OUTPUT FROM ONE SPHERE WAS SIGNAL CONDITIONED ON A LINEAR SCALE; THE DIFFERENTIAL OUTPUT FROM THE TWO SPHERES WAS COMPRESSED LOGARITHMICALLY. IN ADDITION, THE TWO OUTPUTS WERE PASSED THROUGH 450-HZ TO 77-KHZ FILTERS. THESE FILTERED SIGNALS WERE DIFFERENCED AND ALL THREE SIGNALS MADE AVAILABLE FOR ANALYSIS BY THE SWEEP-FREQUENCY ANALYZERS AND DIGITAL CORRELATOR AS PART OF 78-071A-05 (PETIT), 78-071A-06 (UNGSTRUP), AND 78-071A-07 (PEDERSEN) INVESTIGATIONS. THE SENSITIVITY OF THIS PROBE WAS ABOUT 1.E-4 V/M AT DC AND 1.E-8 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, PETIT-----

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 78-071A-05

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R. PETIT
ZMET

BRIEF DESCRIPTION

THIS INVESTIGATION (PART OF ESA EXPERIMENT NO. 5-300) UTILIZED THE 20-M BOOMS (NORMAL TO THE SPACECRAFT SPIN AXIS) AS A DIPOLE ANTENNA, AND THE CARBON SPHERES (PART OF 78-071A-07, PEDERSEN) AS THE RECEIVING ELEMENT. FREQUENCIES FROM 0.3 TO 77 KHZ WERE EMPLOYED. ON TRANSMISSION OF A VLF SIGNAL OF LIMITED DURATION, A TRANSIENT SIGNAL WAS OBSERVED FOR A MUCH LONGER PERIOD THAN THE PULSE LENGTH, PROVIDING THE SPECTRUM OF THE TRANSMITTED SIGNAL INCLUDED ONE OF THE RESONANT FREQUENCIES OF THE PLASMA. THE AMBIENT PLASMA DENSITY WAS INFERRED FROM THE DETERMINATION OF THE RESONANT FREQUENCIES. RECEIVED FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND SIX SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATOR PROVIDED AUTO- AND CROSS-CORRELATIONS UP TO 77 KHZ. BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ COULD BE SELECTED FOR THE CORRELATOR.

----- ESA-GEOS 2, UNGSTRUP-----

INVESTIGATION NAME- ELECTRIC WAVE FIELDS

NSSDC ID- 78-071A-10

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E. UNGSTRUP
DANISH SPACE RES INST

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF THE ESA NO. 5-300 WAVE EXPERIMENT AND EMPLOYED THE FOUR MESH SPHERES MOUNTED AT THE END OF THE 2.5-M AXIAL BOOMS. DIFFERENTIAL MEASUREMENTS FROM THESE SPHERES PROVIDED THE THREE VECTOR COMPONENTS OF THE ELECTRIC FIELD. FREQUENCIES FROM 50 HZ TO 77 KHZ WERE ANALYZED WITH THE SWEEP-FREQUENCY ANALYZER AND THE DIGITAL CORRELATOR. FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND AUTO- AND/OR CROSS-CORRELATION OF THE SENSOR OUTPUTS UP TO 77 KHZ WAS ACCOMPLISHED WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, AND 10.0 KHZ. THE SENSITIVITY OF THE MESH SPHERE PROBES AT 10 KHZ WAS 1.E-6 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, WILKEN-----

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE
DISTRIBUTION

NSSDC ID- 78-071A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - B. WILKEN
OI - G. FROYER (RETIRED)
OI - E. KEPPLER
OI - A. KORTH
OI - J. RUENICH
RPI-ASTRONOMY
RPI-ASTRONOMY
RPI-ASTRONOMY
RPI-ASTRONOMY
RPI-ASTRONOMY

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. 5-321) MEASURED THE ENERGY AND PITCH-ANGLE DISTRIBUTION OF HIGHER-ENERGY ELECTRONS AND PROTONS THAN THAT OF MULLQUIST (78-071A-04), AND WAS COMPLEMENTARY TO THAT INSTRUMENT. THE DETECTOR SYSTEM CONSISTED OF TWO SEPARATE MAGNETIC SPECTROMETERS FOR ELECTRONS, WITH TWO PROTON TELESCOPES ASSOCIATED WITH EACH OF THE MAGNETS THAT FOCUSED THE ELECTRONS AWAY FROM THE PROTON DETECTORS. THERE WERE FIVE RECTANGULAR SOLID-STATE DETECTORS MOUNTED ALONG THE FOCAL LINE OF EACH SPECTROMETER TO MEASURE THE ELECTRONS. EACH SPECTROMETER COVERED AN ANGULAR APERTURE IN ELEVATION ANGLE (RELATIVE TO THE SPIN AXIS) OF 60 DEG. THE TWO DEFLECTION MAGNETS WERE POSITIONED SO THAT ELEVATION ANGLES (DEFERRED TO THE SPIN AXIS) FROM 10 TO 120 DEG, OR 10 DEG CENTERS, WERE COVERED FOR ELECTRONS, GIVING ELECTRON ANGLES OF 23, 46, 63, AND 104 DEG FOR THE PROTON TELESCOPES. THESE TELESCOPES CONSISTED OF A FRONT, SURFACE-BARRIER DETECTOR AND A REAR, SOLID-STATE DETECTOR. ELECTRON ENERGIES FROM 70 TO 200 KEV AND PROTON ENERGIES FROM 0.04 TO 1.4 MEV WERE COVERED. THE EFFECTIVE ANGULAR APERTURE FOR PROTONS WAS 10 DEG X 4 DEG (ELEVATION X AZIMUTH) AND FOR ELECTRONS, WAS 6 DEG X 4 DEG. GEOMETRIC FACTORS IN UNITS OF 1.E-4 SO (CM-SR) WERE FIVE FOR PROTONS AND ONE FOR ELECTRONS. A 12-CHANNEL PULSE-HEIGHT ANALYZER (PHA) FOR PROTONS COULD BE USED FOR ANY ONE OF THE FOUR FRONT DETECTORS, PROVIDED A FRONT-REAR COINCIDENCE WAS DETECTED, AND A 15-CHANNEL PHA COULD BE USED FOR ANY ONE OF THE 10 ELECTRON DETECTORS. THE SINGLES RATE FOR ONE OF THE FOUR PROTON DETECTORS AND THE COINCIDENCE RATE FROM ONE OF THE FOUR

PROTON TELESCOPES COULD BE SELECTED. THERE WERE THREE MODES FOR DATA SELECTION: MODE 0, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR ALL 14 DETECTORS; MODE 1, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR FOUR DETECTORS - 6000 TIME RESOLUTION OF INTEGRAL RATES; AND MODE 2, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS - 6000 TIME RESOLUTION FOR ENERGY SPECTRA. THE MINIMUM TIME FOR A COMPLETE SPECTRUM WAS 600 MS; THE MINIMUM TIME FOR INTEGRAL FLUX VARIATIONS WAS 40 MS. THE SPECTRAL MEASUREMENTS HAD A RESOLUTION OF $\Delta E/E = 0.35$.

----- ESA-GEOS 2, WRENN-----

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 75-071A-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - G.L. WRENN	U COLLEGE LONDON
O1 - R.L.F. BOTS	U COLLEGE LONDON
O1 - R. NORMAN	U COLLEGE LONDON
O1 - W.J. BAITY	UTAH STATE U

BRIEF DESCRIPTION

THE INSTRUMENT (ESA EXPERIMENT NO. 1-302) EMPLOYED TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS MOUNTED ON ONE OF THE LOCKING BOOMS FOR THE MEASUREMENT OF ELECTRONS OR PROTONS OVER THE RANGE 0.5 TO 500 EV ARRIVING CLOSE TO PARALLEL AND CLOSE TO PERPENDICULAR TO THE LOCAL MAGNETIC FIELD. THE ENERGY RANGE WAS COVERED IN 64 STEPS WITH A RELATIVE ENERGY RESOLUTION OF 0.11. ONE ANALYZER HAD ITS APERTURE POINTING ALONG THE NEGATIVE (Z) SPIN AXIS, WITH AN OPENING ANGLE OF 10 DEG X 10 DEG PROVIDING A GEOMETRICAL FACTOR (G) OF 6.8×10^{-4} CM²-SR. THE OTHER ANALYZER HAD AN ANGLE OF 100 DEG WITH RESPECT TO THE Z AXIS, WITH AN OPENING ANGLE OF 0 DEG X 30 DEG, PROVIDING A G OF 9.6×10^{-4} CM²-SR. BOTH DETECTORS HAD TO MEASURE THE SAME TYPE OF PARTICLES AT THE SAME TIME. THE COLLIMATORS OF THESE INSTRUMENTS COULD BE SET AT ANY VOLTAGE FROM -20 TO +32 V IN STEPS OF 0.1 V TO COMPENSATE FOR THE POTENTIAL DIFFERENCE BETWEEN THE INSTRUMENT AND THE UNDISTURBED PLASMA ENVIRONMENT. THIS VOLTAGE DETERMINED THE SPACECRAFT POTENTIAL.

***** GEOS 3*****

SPACECRAFT COMMON NAME- GEOS 3

ALTERNATE NAMES- GEODEVIC SATELLITE-C, GEOS-C

NSSDC ID- 75-027A

LAUNCH DATE- 04/09/75
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

WEIGHT- 340. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 04/10/75
ORBIT PERIOD- 101.02 MIN	INCLINATION- 114.96 DEG
PERIAPSIS- 830. KM ALT	APOAPSIS- 853. KM ALT

PERSONNEL

MC - C.J. FINLEY	NASA HEADQUARTERS
SC - J.P. MURPHY	NASA HEADQUARTERS
PS - M.R. STANLEY	NASA-MFC

BRIEF DESCRIPTION

THE SPACECRAFT WAS AN OCTAHEDRON, TOPPED BY A TRUNCATED PYRAMID, WITH A PARABOLIC REFLECTOR FOR A RADAR ALTIMETER ON THE FLAT BOTTOM SIDE. A METAL RIBBON BOOM WITH END MASS, EXTENDED UPWARD APPROXIMATELY 6.1 M FROM THE TOP OF THE PYRAMID. PASSIVE LASER RETROREFLECTOR CUBES WERE MOUNTED IN A RING AROUND THE PARABOLIC REFLECTOR WITH THE NORMAL VECTOR FROM EACH CUBE FACING 45 DEG OUTWARD FROM THE EARTH DIRECTION OF THE BOOM AXIS. A TURNSTILE ANTENNA FOR VHF AND UHF FREQUENCIES AND SEPARATE ANTENNAS FOR EARTH-VIEWING, 324-MHZ DOPPLER, L-BAND, AND S-BAND TRANSDUCERS WERE MOUNTED SEPARATELY ON FLAT SURFACES NEXT TO THE PARABOLIC REFLECTOR. THE DIMENSION ACROSS THE FLATS OF THE OCTAHEDRON WAS 1.22 M, AND THE SPACECRAFT WAS 1.11 M HIGH. THE MISSION PROVIDED THE STEPPING STONE BETWEEN THE NATIONAL GEODETIC SATELLITE PROGRAM (NGSP) AND THE EARTH AND OCEAN PHYSICS APPLICATION PROGRAM. IT PROVIDED DATA TO REFINE THE GEODETIC AND GEOPHYSICAL RESULTS OF THE NGSP AND SERVED AS A TEST FOR NEW SYSTEMS. MISSION OBJECTIVES WERE TO PERFORM A SATELLITE ALTIMETRY EXPERIMENT IN ORBIT, TO SUPPORT FURTHER THE CALIBRATION AND POSITION DETERMINATION OF NASA AND OTHER AGENCY C-BAND RADAR SYSTEMS, AND TO PERFORM A SATELLITE-TO-SATELLITE TRACKING EXPERIMENT WITH THE ATS 6 SPACECRAFT USING AN S-BAND TRANSDUCER SYSTEM. THIS SYSTEM WAS ALSO USED FOR PERIODIC GEOS 3 TELEMETRY DATA RELAY THROUGH ATS 6, TO SUPPORT FURTHER THE INTERCOMPARISON OF TRACKING SYSTEMS, TO INVESTIGATE THE SOLID-EARTH DYNAMIC PHENOMENA THROUGH PRECISION LASER TRACKING, TO REFINE FURTHER ORBIT DETERMINATION TECHNIQUES AND DETERMINE INTERMEDIATE TIES AND GRAVITY MODELS, AND TO SUPPORT THE CALIBRATION AND POSITION DETERMINATION OF NASA-STON S-BAND TRACKING STATIONS.

----- GEOS 3, ANDERLE-----

INVESTIGATION NAME- US NAVY DOPPLER SYSTEM

NSSDC ID- 75-027A-05

INVESTIGATIVE PROGRAM
CODE 00

INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL

PI - R.J. ANDERLE

USN SURFACE WEAPNS CTR

BRIEF DESCRIPTION

THE DOPPLER TECHNIQUE OF TIMING AND MEASURING THE FREQUENCY SHIFT OF RADIO TRANSMISSIONS FROM A MOVING SPACECRAFT WAS USED TO OBTAIN DATA THAT FURTHER ESTABLISHED THE STRUCTURE OF THE EARTH'S GRAVITATIONAL FIELD THROUGH THE COMPARISON OF NEW WITH ESTABLISHED GEODETIC MEASUREMENTS. TWO TRANSMITTERS WERE OPERATED AT FREQUENCIES OF 162 AND 324 MHZ. THE DUAL FREQUENCIES WERE COHERENTLY RELATED AND UTILIZED IN CONJUNCTION WITH GROUND DOPPLER RECEIVING STATIONS TO OBTAIN PRECISION SATELLITE RANGE-RATE DATA. THE DUAL FREQUENCIES WERE GENERATED BY A HIGHLY STABLE OSCILLATOR DRIVING TWO FREQUENCY MULTIPLIERS. BOTH FREQUENCIES WERE USED SIMULTANEOUSLY TO PROVIDE COMPARISON DATA OF THE EFFECT OF THE IONOSPHERE ON THE SIGNALS, WHICH WERE TO CORRECT THE DATA FOR THIS ERROR SOURCE. THIRTEEN OR MORE FIRED GROUND RECEIVING STATIONS OPERATED BY THE U.S. NAVY DOPPLER TRACKING NETWORK (TRANET) AND 12 PORTABLE RECEIVERS OPERATED BY THE U.S. ARMY, U.S. NAVY, AND U.S. AIR FORCE -- ALL UNDER THE DIRECTION OF THE DEFENSE MAPPING AGENCY (DMA) -- WERE EXPECTED TO BE IN OPERATION. OBSERVATIONS MADE FROM THREE OR MORE KNOWN STATIONS ALLOWED DEDUCTION OF ORBITAL PARAMETERS. RANGE-RATE DATA FROM EITHER THE FIRED STATIONS OR THE RECEIVERS WERE ESTIMATED TO BE ACCURATE WITHIN 0.5 CM/S.

----- GEOS 3, GALICINAO-----

INVESTIGATION NAME- SATELLITE-TO-SATELLITE TRACKING

NSSDC ID- 75-027A-06

INVESTIGATIVE PROGRAM
CODE 00

INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL

PI - J.V. GALICINAO

NASA-GSFC

BRIEF DESCRIPTION

THE SATELLITE-TO-SATELLITE TRACKING (SST) SYSTEM USED CONSISTED OF (1) THE GROUND-BASED APPLICATION TECHNOLOGY SATELLITE RANGING (ATER) SYSTEM (MODIFIED FOR SATELLITE-TO-SATELLITE TRACKING), (2) THE WIDEBAND COMMUNICATION TRANSDUCER ON THE ATS 6 GEOSYNCHRONOUS SPACECRAFT, AND (3) THE RANGING TRANSDUCER ON THE LOW-ORBITING SATELLITE.

----- GEOS 3, JACKSON-----

INVESTIGATION NAME- C-BAND SYSTEM

NSSDC ID- 75-027A-03

INVESTIGATIVE PROGRAM
CODE 00

INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL

PI - E.B. JACKSON

NASA-MFC

BRIEF DESCRIPTION

THE C-BAND TRANSDUCER SUBSYSTEM CONSISTED OF TWO TRANSDUCERS: ONE, THE GEOS 3 NONCOHERENT TYPE AND THE OTHER, A COHERENT C-BAND TRANSDUCER. THE NONCOHERENT TRANSDUCER PROVIDED FOR RANGE AND ANGLE MEASUREMENTS, WHILE THE COHERENT TRANSDUCER PROVIDED FOR BOTH RANGE, RANGE-RATE, AND ANGLE MEASUREMENTS. BOTH TRANSDUCERS RECEIVED SIGNALS AT 5690 MHZ. THE COHERENT TRANSDUCER TRANSMITTED AT 5690 MHZ, WHILE THE NONCOHERENT TYPE TRANSMITTED AT 5765 MHZ. EACH C-BAND TRANSDUCER TRANSMITTED ONE PULSE FOR EACH CODED GROUP OF PULSES TRANSMITTED BY A GROUND TRACKING C-BAND RADAR. THE INTERNAL DELAY BETWEEN THE RECEIVED GROUND-TRANSMITTED PULSE CODE AND THE TRANSDUCER-TRANSMITTED PULSE WAS CALIBRATED PRIOR TO LAUNCH. EACH TRANSDUCER (WHILE OPERATING SEPARATELY OR SIMULTANEOUSLY) OPERATED IN EITHER STANDBY OR OVERRIDE MODE. IN STANDBY, THE RECEIVER BECAME OPERATIONAL AFTER APPROXIMATELY 60 S OF INTERROGATION, OR LONG ENOUGH FOR THE OUTPUT TIME TO WARM UP. IN OVERRIDE, THE OUTPUT TIME FILAMENT WAS ENERGIZED BY THE EXTERNAL COMMAND AND THE WARM-UP DELAY CIRCUIT BYPASSED AFTER THE TIME WARMED UP, THUS ALLOWING THE TRANSDUCER TO RESPOND IMMEDIATELY TO INTERROGATION SIGNALS. THIS OVERRIDE MODE REDUCED GROUND-COMMAND REQUIREMENTS AND CONSERVED SPACECRAFT POWER.

----- GEOS 3, PUEBY-----

INVESTIGATION NAME- RADAR ALTIMETER SYSTEM

NSSDC ID- 75-027A-01

INVESTIGATIVE PROGRAM
CODE ER

PERSONNEL
PI - C.C. STEPHANIDES

NASA-GSFC

INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL

PI - C.L. PURDY

NASA-WFC

BRIEF DESCRIPTION

THE RADAR-ALTIMETER EXPERIMENT WAS THE HIGHEST PRIORITY EXPERIMENT ON GEOS 3. THE OBJECTIVES WERE TO DETERMINE THE FEASIBILITY AND UTILITY OF A SPACEBORNE RADAR ALTIMETER FOR MAPPING THE TOPOGRAPHY OF THE OCEAN SURFACE WITH AN ABSOLUTE ACCURACY WITHIN 5 M, AND WITH A RELATIVE ACCURACY OF 1 TO 2 M, TO DETERMINE THE FEASIBILITY OF MEASURING THE DEFLECTION OF THE VERTICAL AT SEA, TO DETERMINE THE FEASIBILITY OF MEASURING WAVE HEIGHT, AND TO CONTRIBUTE TO THE TECHNOLOGY LEADING TO A FUTURE OPERATIONAL ALTIMETER-SATELLITE SYSTEM WITH A 10-CM MEASUREMENT CAPABILITY. TO MEET THE EXPERIMENT OBJECTIVES, THE ALTIMETER HAD TWO DISTINCT DATA-GATHERING MODES: A LONG-PULSE ALTIMETRY DATA MODE AND A SHORT-PULSE MODE. PERFORMANCE CAPABILITIES AND OPERATING CHARACTERISTICS OF THE ALTIMETER DIFFERED FOR THE TWO MODES. BOTH MODES OPERATED ON A 13.9-GHZ FREQUENCY, USED A PARABOLIC ANTENNA, HAD A MAXIMUM RANGE ACQUISITION TIME OF 6 S, AND HAD AN ALTITUDE GRANULARITY OF PLUS OR MINUS 0.2 M. DIFFERING CHARACTERISTICS WERE (1) ALTITUDE DATA RATE FOR LONG PULSE WAS TWO READINGS/S AND FOR SHORT PULSE SIX READINGS/S, AND (2) INPUT POWER FOR LONG PULSE WAS 50 W, FOR SHORT PULSE 100 W. THE GEOS 3 RADAR ALTIMETER HAD SEVERAL FEATURES IN COMMON WITH THE ALTIMETER USED ON THE SATLAB SATELLITE, BUT HAD ADVANTAGES OVER THE SKYLAB ALTIMETER BECAUSE OF IMPROVED ACCURACY AND ABILITY TO OPERATE OVER EXTENDED AREAS FOR GREATER PERIODS OF TIME, THEREBY PROVIDING THE CAPABILITY TO EXAMINE THE EARTH OVER LONGER ARCS AND OBSERVE EXTENSIVE OCEAN AREAS.

----- GEOS 3, SALZBERG-----

INVESTIGATION NAME- S-BAND TRACKING SYSTEM

NSSDC ID- 75-027A-02

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL

PI - I.M. SALZBERG

NASA-GSFC

BRIEF DESCRIPTION

THE S-BAND TRANSPONDER SUBSYSTEM PROVIDED METRIC TRACKING DATA (RANGE, RANGE-RATE). IT TRANSMITTED TELEMETRY DATA, BUT DID NOT RECEIVE COMMANDS. THE TRANSPONDER OPERATED IN THE FOLLOWING THREE MODES: (1) SATELLITE-TO-SATELLITE TRACKING (SST) FROM THE ROSMAN OR EUROPEAN ATS GROUND STATIONS THROUGH ATS 6 TO GEOS 3 AND BACK, (2) DIRECT USB (DOPPLER ONLY) GROUND-STATION TRACKING OF GEOS 3, AND (3) DIRECT GRARR GROUND-STATION TRACKING OF GEOS 3. THE TRANSPONDER SUBSYSTEM CONSISTED OF A SINGLE-CHANNEL TRANSPONDER, A POWER AMPLIFIER, A DIPLEXER, AND AN EARTH-VIEWING AND ATS-VIEWING ANTENNA SYSTEM. THE ANTENNAS WERE SELECTABLE BY GROUND COMMAND. THE EARTH-VIEWING ANTENNA FOR DIRECT TRACKING, WITH THE USB AND GRARR GROUND STATIONS HAD APPROXIMATELY SPHERICAL COVERAGE AND A MINIMUM OF 0 DB GAIN WITHIN 60 DEG OF THE SPACECRAFT Z AXIS. THE SST ANTENNA SYSTEM CONSISTED OF AN IN-TRACK ARRAY THAT PROVIDED A 3-DB GAIN IN THE DIRECTION OF ATS FOR GEOS ASCENDING AND DESCENDING NODE PASSES, WHICH CROSSED THE EQUATOR WITHIN PLUS OR MINUS 26 DEGREES OF THE ATS SUBSATELLITE POINT. IN THE SST OPERATION MODE, THE INTERROGATION SIGNAL WAS FIRST TRANSMITTED AT C-BAND BY THE ATS GROUND STATION TO THE ATS 6 SPACECRAFT. ATS 6 INSTRUMENTATION COHERENTLY ALTERED THE SIGNAL, MAKING IT COMPATIBLE WITH THE INPUT FREQUENCY (2069.1125 MHZ) OF THE S-BAND TRANSPONDER ON GEOS 3, AND TRANSMITTED THE SIGNAL TO GEOS 3. GEOS 3 THEN, AFTER TRANSLATING THE RECEIVED SIGNAL, RETRANSMITTED IT TO ATS 6 AS IF ATS 6 WERE ANOTHER GROUND STATION. ATS 6 THEN RETRANSMITTED THE SIGNAL TO THE ATS GROUND STATION AT C-BAND. RANGE SUM AND RANGE-RATE SUM WERE OBTAINED BY COMPARING THE INTERROGATION AND RESPONSE SIGNALS. THE S-BAND ON GEOS 3 WAS ALSO TRACKED BY THE USB AND GRARR SYDN STATIONS. CARRIER FREQUENCIES (2069.1125 MHZ UP AND 2247 MHZ DOWN) WERE IDENTICAL TO THOSE OF THE SST MODE. COHERENT GRARR TRACKING WAS ACCOMPLISHED VIA STANDARD GRARR RANGING SIDE TONES. USB TRACKING CONSISTED ONLY OF COHERENT-CARRIER DOPPLER TRACKING. THE S-BAND TRANSPONDER WAS A SINGLE-CHANNEL TRANSPONDER; THEREFORE, SIMULTANEOUS OPERATION WAS NOT POSSIBLE.

----- GEOS 3, STEPHANIDES-----

INVESTIGATION NAME- LASER TRACKING REFLECTOR

NSSDC ID- 75-027A-04

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

BRIEF DESCRIPTION

LASER CORNER REFLECTORS, COMPOSED OF 270 (MINIMUM) 35-MM CUBES, AND GROUND-BASED LASER SYSTEMS WERE USED TO OBTAIN PRECISE SATELLITE TRACKING INFORMATION. THE APPLIED PHYSICS LABORATORY PROVIDED THE LASER CUBE REFLECTOR PANELS. THE CUBES WERE CONFIGURED ON THE LATERAL SURFACE OF A CONIC FRUSTUM, WITH THE LATERAL SURFACE OF THE FRUSTUM ADJOINING THE BOTTOM, EARTH-ORIENTED SURFACE OF THE SPACECRAFT AT A 45-DEG ANGLE. THE BASE OF THE FRUSTUM MEASURED APPROXIMATELY 0.9 METERS IN DIAM. WHEN ILLUMINATED BY A LASER LIGHT PULSE FROM THE GROUND, EACH RETROREFLECTOR CUBE IN THE ARRAY REFLECTED THE LIGHT BACK TO A SPECIAL TELESCOPE RECEIVER ON THE GROUND. THE REFLECTED LIGHT WAS PICKED UP BY THE TELESCOPE, AND THE OPTICAL IMPULSES CONVERTED TO AN ELECTRICAL SIGNAL. A DIGITAL COUNTER RECORDED THE TIME WHEN THE LIGHT BEAM WAS RETURNED TO THE GROUND. THE TOTAL TRAVEL TIME OF THE LIGHT PULSES, FROM GROUND TO SATELLITE AND BACK TO THE GROUND, MEASURED THE DISTANCE TO THE SATELLITE, THUS FORMING THE BASIS OF THE SATELLITE OPTICAL LASER SYSTEM. THE FOLLOWING OBSERVATIONAL SYSTEMS ACQUIRED THE NECESSARY DATA: NASA/Wallops LASER RANGING SYSTEMS, SAO LASER RANGING SYSTEMS, GSFC LASER RANGING SYSTEMS, AND OTHER NATIONAL AND INTERNATIONAL LASER STATIONS AS DETERMINED.

***** GMS*****

SPACECRAFT COMMON NAME- GMS

ALTERNATE NAMES- GEOSTATION.METEOROL.SAT.

NSSDC ID- 77-065A

LAUNCH DATE- 07/14/77

WEIGHT- 647. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

JAPAN
UNITED STATES

NASDA
NASA-OSIA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1429.4 MIN
PERIAPSIS- 35531. KM ALT

EPOCH DATE- 07/15/77
INCLINATION- 0.0 DEG
APOAPSIS- 35779. KM ALT

PERSONNEL

PM - N. KODAIRA
PS - JMA STAFF

METEOROL SATELLITE CTR
JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE GEOSTATIONARY METEOROLOGICAL SATELLITE (GMS) WAS JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM). ONE MAJOR OBJECTIVE OF GARP WAS TO OBTAIN SYNOPTIC GLOBAL METEOROLOGICAL DATA SETS FOR ONE YEAR'S DURATION (TO INCLUDE TWO OPTIMIZED OBSERVING PERIODS OF A FEW WEEKS EACH). THESE DATA SERVED AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT WAS HOPED THAT DETERMINATION COULD BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT WAS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE WAS COVERED WITH SOLAR CELLS WHICH COULD PROVIDE 225 W. THE SATELLITE WAS SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE SATELLITE WAS POSITIONED NEAR 140 DEG E AND DESIGNED TO OPERATE FOR 5 YEARS.

----- GMS, JMA STAFF-----

INVESTIGATION NAME- VISIBLE AND INFRARED SPIN-SCAN
RADIOMETER (VISSR)

NSSDC ID- 77-065A-01

INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - JMA STAFF

JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE VISIBLE-IR SPIN-SCAN RADIOMETER (VISSR) WAS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1. IT MADE BOTH NIGHT IR (10.5 TO 12.5 MICROMETERS) AND DAY IR, PLUS VISIBLE (.5 TO .75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30-MIN INTERVALS. THE VISIBLE CHANNEL HAD A RESOLUTION OF ABOUT 1.25 KM AND THE IR CHANNEL HAD A RESOLUTION OF ABOUT 5 KM AT NAHIR. REAL-TIME TRANSMISSION WAS AVAILABLE TO THE DATA ACQUISITION STATION IN JAPAN, WITH ADDITIONAL DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEEDED.

----- GMS, JMA STAFF-----

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- 77-069A-03 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GMS INCLUDED A COMMUNICATIONS FACILITY. THE OBJECTIVES OF THIS EQUIPMENT WERE (1) TO COLLECT AND RELAY WEATHER OBSERVATIONS FROM REMOTE STATIONS, INCLUDING BUOYS, SHIPS, AND UNMANNED STATIONS, AND (2) TO TRANSMIT WEATHER INFORMATION AND ANALYSES FROM THE CENTRAL WEATHER FACILITY TO OTHER WEATHER STATIONS.

----- GMS, KOHNO-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- 77-069A-02 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. KOHNO METEOROL RES INST

BRIEF DESCRIPTION
THE SPACE ENVIRONMENT MONITOR (SEM) EXPERIMENT OBSERVED THE IN SITU CHARGED PARTICLE ENVIRONMENT. SOLAR PROTONS (1 TO 500 MEV), ALPHA PARTICLES (8 TO 390 MEV) AND SOLAR ELECTRONS (GREATER THAN 2 MEV) WERE DISCRIMINATED, AND THEIR RESPECTIVE ENERGIES MONITORED BY MEANS OF A NUMBER OF SOLID-STATE DETECTORS.

***** GMS-2*****

SPACECRAFT COMMON NAME- GMS-2
ALTERNATE NAMES- GEOSTATION.METEORO.SAT.2

NSSDC ID- 81-076A

LAUNCH DATE- 08/10/81 WEIGHT- 647. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
JAPAN NASDA

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE-
ORBIT PERIOD- 1440. MIN INCLINATION- 29.8 DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - N. KODAIRA METEOROL SATELLITE CTR
PS - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GEOSTATIONARY METEOROLOGICAL SATELLITES (GMS) WERE JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). ONE MAJOR OBJECTIVE OF GARP WAS TO OBTAIN SYNOPTIC GLOBAL METEOROLOGICAL DATA SETS FOR ONE YEAR'S DURATION (INCLUDING TWO OPTIMIZED OBSERVING PERIODS OF A FEW WEEKS EACH). THESE DATA WILL CONTINUE TO SERVE AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT IS HOPED THAT DETERMINATION CAN BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT WAS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE WAS COVERED WITH SOLAR CELLS WHICH PROVIDED 225 W. THE SATELLITE WAS SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE SATELLITE WAS POSITIONED NEAR 140 DEG E AND WAS DESIGNED TO OPERATE FOR 5 YEARS. THIS WAS A FOLLOW-ON GMS TYPE SPACECRAFT LAUNCHED AND CONTROLLED BY NASDA OF JAPAN.

----- GMS-2, JMA STAFF-----

INVESTIGATION NAME- VISIBLE AND INFRARED SPIN-SCAN
RADIOMETER (VISSR)

NSSDC ID- 81-076A-01 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR) WAS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1 AND GMS. IT MADE BOTH NIGHT (IR 10.5 TO 12.5 MICROMETERS) AND DAY IR MEASUREMENTS, PLUS VISIBLE (0.5 TO 1.75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30-MIN INTERVALS. THE VISIBLE CHANNEL HAD A RESOLUTION OF ABOUT 1.25 KM, AND THE IR CHANNEL HAD A RESOLUTION OF ABOUT 5 KM AT NAZIR. REAL-TIME TRANSMISSION WAS AVAILABLE TO THE DATA ACQUISITION STATION IN

JAPAN. WITH ADDITIONAL DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEEDED.

----- GMS-2, JMA STAFF-----

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- 81-076A-03 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GMS-2 INCLUDED A COMMUNICATIONS FACILITY. THE OBJECTIVES OF THIS EQUIPMENT WERE (1) TO COLLECT AND RELAY WEATHER OBSERVATIONS FROM REMOTE STATIONS, INCLUDING BUOYS, SHIPS, AND UNMANNED STATIONS, AND (2) TO TRANSMIT WEATHER INFORMATION AND ANALYSES FROM THE CENTRAL WEATHER FACILITY TO OTHER WEATHER STATIONS.

----- GMS-2, KOHNO-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- 81-076A-02 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. KOHNO METEOROL RES INST

BRIEF DESCRIPTION
THE SPACE ENVIRONMENT MONITOR (SEM) EXPERIMENT OBSERVED THE IN SITU CHARGED PARTICLE ENVIRONMENT. SOLAR PROTONS (1 TO 500 MEV), ALPHA PARTICLES (8 TO 390 MEV), AND SOLAR ELECTRONS (GREATER THAN 2 MEV) WERE DISCRIMINATED, AND THEIR RESPECTIVE ENERGIES MONITORED BY MEANS OF A NUMBER OF SOLID-STATE DETECTORS.

***** GOES 1*****

SPACECRAFT COMMON NAME- GOES 1
ALTERNATE NAMES- GMS-C, GOES-A
GOES-1

NSSDC ID- 75-100A

LAUNCH DATE- 10/16/75 WEIGHT- 631. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/17/75
ORBIT PERIOD- 1412.0 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 34165. KM ALT APOAPSIS- 36458. KM ALT

PERSONNEL
PM - R.N. PICKARD NASA-65FC
PS - W.E. SHENK NASA-65FC

BRIEF DESCRIPTION
GOES 1 (GMS-C) WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY AND NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 198.5 CM IN DIAMETER AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELL AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELL AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT. ON DECEMBER 1, 1978,

RESPONSIBILITY FOR GOES 1 WAS TURNED OVER TO ESA TO USE AS PART OF GARP. IT WAS STATIONED OVER THE INDIAN OCEAN AND CONTROLLED BY ESOC IN DARMSTADT, FRG. IN DECEMBER 1979, IT WAS PLACED UNDER THE CONTROL OF NOAA AND POSITIONED AT 135 DEG W.

----- GOES 1, NESS STAFF-----

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 75-100A-01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY SHAPED SCAN MIRROR AND COLLECTED BY A RITCHIEY-CRETEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 K, WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WALLPOLS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA, AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD.

----- GOES 1, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-100A-05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA-HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED, EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEXAF TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL, GROUND-BASED APT RECEIVER STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS FOR CONTACT IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPES AND VARIETIES OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-100A-02

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - M.H. SAUER NOAA-ERL
OI - R.W. GRUBB NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH HAVING A TAILGRED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN PARTICLE-TYPE/ENERGY MEASUREMENTS. SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 500 MEV. SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV. ONE CHANNEL MEASURED ELECTRONS GREATER THAN 2.0 MEV.

----- GOES 1, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-100A-03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.W. GRUBB NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAD A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27E-3 M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5 TO 3 A.

----- GOES 1, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 75-100A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.W. GRUBB NOAA-ERL
OI - J.C. JOSELYN NOAA-ERL

BRIEF DESCRIPTION

A BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WAS DEPLOYED ON A BOOM ABOUT .61 M LONG. THE MAGNETOMETER HAD ONE SENSOR ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS, AND MEASURED THE MAGNETIC FIELD AT SYNCHRONOUS ALTITUDE. EACH SENSOR HAD A SELECTABLE RANGE (+50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** GOES 2*****

SPACECRAFT COMMON NAME- GOES 2
ALTERNATE NAMES- GOES-B

NSSDC ID- 77-048A

LAUNCH DATE- 06/16/77 WEIGHT- 294. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/21/77
ORBIT PERIOD- 1436. MIN INCLINATION- 0.88 DEG
PERIAPSIS- 35266. KM ALT APOAPSIS- 36304. KM ALT

PERSONNEL
PM - R.M. PICKARD
PS - W.E. SHENK

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

GOES 2 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED SYNCHRONOUS ORBIT.

----- GOES 2, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 77-048A-05

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED, DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 77-048A-02

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - M.M. SAUER
OI - R.N. GRUBB

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS: SEVEN CHANNELS MEASURING PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURING ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURING ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 77-048A-03

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - R.F. DONNELLY

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO ENSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-Å X RAYS AND HAD A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM, AND HAD A 1.27E-3 M BERYLLIUM WINDOW FOR MEASUREMENT OF X RAYS IN THE WAVELENGTH RANGE 0.5 TO 3 Å.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 77-048A-04

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - J.C. JOSELYN

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WAS A BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH THE TWO SENSORS ALIGNED AT RIGHT ANGLES TO ONE ANOTHER. AFTER MOUNTING ON A SHORT BOOM (ABOUT .61 M), ONE SENSOR WAS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAD A SELECTABLE RANGE (50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** GOES 3*****

SPACECRAFT COMMON NAME- GOES 3
ALTERNATE NAMES- 10952, GOES-C

NSSDC ID- 78-062A

LAUNCH DATE- 06/16/78 WEIGHT- 294. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES
UNITED STATES

NOAA-NESS
NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1450.8 MIN
PERIAPSIS- 35469.1 KM ALT

EPOCH DATE- 06/17/78
INCLINATION- 1.7 DEG
APOAPSIS- 36679.2 KM ALT

PERSONNEL

PM - R.M. PICKARD
PS - W.E. SHENK

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

GOES 3 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND XRAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT

ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED ORBIT.

----- GOES 3, NESS STAFF-----

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 78-062A-01

INVESTIGATIVE PROGRAM
CODE EN/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF
OI - W.E. SHENK

NOAA-NESS
NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 3 WAS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY SHAPED SCAN MIRROR AND COLLECTED BY A RITCHIEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL TO THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAZIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NAZIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 DEG K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WILLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE SKETCHER,' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. THE VISSR DATA WERE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES 3, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 78-062A-05

INVESTIGATIVE PROGRAM
CODE EN/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA-HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED, EARTH-BASED, DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WIFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 78-062A-02

INVESTIGATIVE PROGRAM
CODE EN/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - M.H. SAUER

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURING PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURING ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURING ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 78-062A-03

INVESTIGATIVE PROGRAM
CODE EN/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - R.F. DONNELLY

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAD A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM, AND HAD A 1.27E-5 M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5 TO 3 A.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 78-062A-04

INVESTIGATIVE PROGRAM
CODE EN/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - J.C. JOSELYN

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WAS A BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH THE TWO SENSORS ALIGNED AT RIGHT ANGLES TO ONE ANOTHER. AFTER MOUNTING ON A SHORT BOOM (ABOUT .61 M), ONE SENSOR WAS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAD A SELECTABLE RANGE (50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** GOES 4 *****

SPACECRAFT COMMON NAME- GOES 4
ALTERNATE NAMES- GOES-D, 11964

NSSDC ID- 80-074A

LAUNCH DATE- 09/09/80

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

WEIGHT- 660. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NOAA-NESS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1436.2 MIN
PERIAPSIS- 35776. KM ALT

EPOCH DATE- 09/26/80
INCLINATION- 0.2 DEG
APOAPSIS- 35800. KM ALT

PERSONNEL

MG - A.J. CERVENKA
PM - R.N. PICKARD
PS - W.E. SHENK

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

GOES 4 WAS THE FOURTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISSR (VISIBLE INFRARED SPIN SCAN RADIOMETER) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 238 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSDUCER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT.

----- GOES 4, NESS STAFF-----

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER
ATMOSPHERIC SOUNDER (VAS)

NSSDC ID- 80-074A-01

INVESTIGATIVE PROGRAM
CODE E0/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF
OI - W.E. SHENK

NOAA-NESS
NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE-INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) OPERATED IN THREE DISTINCT MODES TO PROVIDE PARAMETER FLEXIBILITY, SPECTRAL BAND SELECTION, GEOGRAPHIC LOCATION, AND S/N RATIO. THE VISSR MODE WAS THE SAME AS THE VISSR SYSTEM ON BOARD GOES 1, 2, 3. BOTH THE IR CHANNEL (10.5 TO 12.5 MICROMETERS) AND VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USED COMMON OPTICS. INCOMING RADIATION WAS COLLECTED BY A RITCHY-CREVEN OPTICAL SYSTEM. THE SPINNING MOTION OF THE SPACECRAFT (100 RPM) PROVIDED A WEST-TO-EAST (W-TO-E) SCAN MOTION. SCAN MISSION TILT AFTER EACH SPIN PROVIDED A NORTH-TO-SOUTH (N-TO-S) SCAN MOTION. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND 2 MIN TO RESET FOR THE NEXT IMAGE. EIGHT VISIBLE-SPECTRUM DETECTORS (0.9-KM HORIZONTAL RESOLUTION) AND ONE MERCURY-CADMIUM TELLURIDE IR DETECTOR (6.9-KM HORIZONTAL RESOLUTION) SWEEPED THE EARTH DURING EACH SCAN. THE DWELL-SOUNDING MODE USED UP TO 12 SPECTRAL FILTERS IN A WHEEL COVERING THE RANGE 678.7 PER CM (14.74 MICROMETERS) THROUGH 2535 PER CM (3.94 MICROMETERS) POSITIONED INTO THE OPTICAL TRAIN WHILE THE SCANNER WAS DWELLING ON A SINGLE N-TO-S SCAN LINE. THE FILTER WHEEL COULD BE PROGRAMMED SO THAT EACH SPECTRAL BAND FILTER COULD DWELL ON A SINGLE SCAN LINE FOR FROM 0 TO 255 SPACECRAFT SPINS. EITHER THE 6.9-KM OR 13.8-KM RESOLUTION DETECTORS COULD BE SELECTED FOR THE SEVEN FILTER POSITIONS OPERATING IN THE SPECTRAL REGION 701.6 PER CM (14.25 MICROMETERS) THROUGH 1487 PER CM (6.725 MICROMETERS). FOR THE REMAINING FIVE SPECTRAL BANDS THE 13.8-KM RESOLUTION DETECTORS WERE USED. SELECTABLE FRAME SIZE, POSITION AND SCAN DIRECTION WERE ALSO PROGRAMMABLE VIA GROUND COMMAND. FOR THE VAS DEMONSTRATION, 18-BIT REDUCED RESOLUTION (3.5-KM) VISIBLE DATA WERE PROVIDED FOR IMAGING. IN SOME OF THE SPECTRAL REGIONS, MULTIPLE-LINE DATA WERE REQUIRED TO ENHANCE THE SIGNAL-TO-NOISE (S/N) RATIO. TYPICALLY, 167 SATELLITE SPINS AT THE SAME N-TO-S SCAN LINE POSITION WERE REQUIRED TO OBTAIN THE DESIRED SOUNDING DATA. THIS NUMBER OF SPINS PER LINE SHOULD BE ADEQUATE TO OBTAIN SOUNDINGS HAVING A 30- X 30-KM RESOLUTION AND REQUIRE APPROXIMATELY 1.9 MINUTES ON THE AVERAGE. THE MULTISPECTRAL IMAGING (MSI) MODE COULD PROVIDE NORMAL VISSR IR IMAGING PLUS DATA IN ANY TWO SELECTED SPECTRAL BANDS HAVING A SPATIAL RESOLUTION OF 13.8 KM. THIS MODE OF OPERATION TOOK ADVANTAGE OF THE SMALL MERCURY-CADMIUM TELLURIDE DETECTOR OFFSET IN THE N TO S PLANE. USING THE DATA FROM THESE DETECTORS SIMULTANEOUSLY PRODUCED A COMPLETE INFRARED MAP WHEN THE DETECTORS WERE OPERATED EVERY OTHER SCAN LINE. THIS ALLOWED USING THE LARGER DETECTORS DURING HALF OF THE IMAGING/SCANNING SEQUENCE PERIOD TO OBTAIN ADDITIONAL SPECTRAL INFORMATION. UNLIMITED N-TO-S FRAME SIZE AND POSITION SELECTION, WITHIN THE MAXIMUM N-TO-S FOV SCAN DIRECTION, COULD BE SELECTED. VISIBLE DATA WERE NOT AVAILABLE IN THIS MODE SINCE THE VAS WAS CONSTRAINED TO THE LDR SYSTEM. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, Wallops Island, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER,' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE

SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. THE VISSR DATA WERE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING. SINCE WOLLOPS ISLAND IS COMMITTED TO NOAA OPERATIONAL SUPPORT, DATA FROM THE VAS MSI MODE AND THE DWELL SOUNDING MODE WERE NOT 'STRETCHED'.

----- GOES 4, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND
TRANSMISSION SYSTEM

NSSDC ID- 80-074A-05

INVESTIGATIVE PROGRAM
CODE E0/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED, EARTH-BASED, DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEXAR TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 4, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 80-074A-02

INVESTIGATIVE PROGRAM
CODE E0/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - H.W. SAUER
OI - R.W. GRUBB

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE ENERGETIC PARTICLE MONITOR CONSISTED OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITORED PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE WAS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE RANGE .GE. 500 KEV.

----- GOES 4, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 80-074A-03

INVESTIGATIVE PROGRAM
CODE E0/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.F. DONNELLY
OI - R.W. GRUBB

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTED OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY WERE 0.5 TO 3A, 1.0E-13 J PER CM PER S; AND 1 TO 8A, 1.0E-12 J PER CM PER S; WITH A DYNAMIC RANGE OF 1.E4.

----- GOES 4, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 80-074A-04

INVESTIGATIVE PROGRAM
CODE E0/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - J.C. JOSELYN

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER HAD A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** GOES 5 *****

SPACECRAFT COMMON NAME- GOES 5
ALTERNATE NAMES- GOES-E

NSSDC ID- 81-049A

LAUNCH DATE- 05/22/81 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES
UNITED STATES

NOAA-NESB
NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1434. MIN
PERIAPSIS- 35715. KM ALT

EPOCH DATE- 07/29/81
INCLINATION- 0.32 DEG
APOAPSIS- 35749. KM ALT

PERSONNEL
PM - A.J. CIVENKA
RM - R.H. PICKARD
PS - W.E. SHENK

NASA HEADQUARTERS
NASA-GSPC
NASA-GSPC

BRIEF DESCRIPTION

GOES 5 WAS THE FIFTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADially FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT.

***** GOES 5, NESS STAFF *****

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER
ATMOSPHERIC SOUNDER (VAS)

NSSDC ID- 81-049A-01

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF
OI - W.E. SHENK

NOAA-NESB
NASA-GSPC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) OPERATES IN THREE DISTINCT MODES TO PROVIDE PARAMETER FLEXIBILITY, SPECTRAL BAND SELECTION, GEOGRAPHIC LOCATION, AND SIGNAL-TO-NOISE (S/N) RATIO. THE VISSR MODE WAS THE SAME AS THE VISSR SYSTEM ON BOARD THE OTHER GOES SPACECRAFT. BOTH THE IR CHANNEL (10.5 TO 12.5 MICROMETERS) AND VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USED COMMON OPTICS. INCOMING RADIATION WAS COLLECTED BY A RITCHIEY-CHRETIEN OPTICAL SYSTEM. THE SPINNING MOTION OF THE SPACECRAFT (100 RPM) PROVIDED A WEST-TO-EAST (W-TO-E) SCAN MOTION. SCAN MISSION TILT AFTER EACH SPIN PROVIDED A NORTH-TO-SOUTH (N-TO-S) SCAN MOTION. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND 2 MIN TO RESET FOR THE NEXT IMAGE. EIGHT VISIBLE-SPECTRUM DETECTORS (0.9 KM HORIZONTAL RESOLUTION) AND ONE MERCURY-CADMIUM TELLURIDE IR DETECTOR (6.9 HORIZONTAL RESOLUTION) SWEEP THE EARTH DURING EACH SCAN. THE BUELL-SOUNDING MODE USED UP TO 12

SPECTRAL FILTERS IN A WHEEL COVERING THE RANGE 678.7 PER CM (14.74 MICROMETERS) THROUGH 2535 PER CM (3.94 MICROMETERS) POSITIONED INTO THE OPTICAL TRAIN WHILE THE SCANNER WAS DWELLING ON A SINGLE N-TO-S SCAN LINE. THE FILTER WHEEL COULD BE PROGRAMMED SO THAT EACH SPECTRAL BAND FILTER COULD DWELL ON A SINGLE SCAN LINE FOR FROM 0 TO 255 SPACECRAFT SPINS. EITHER THE 6.9-KM OR 13.8-KM RESOLUTION DETECTORS COULD BE SELECTED FOR THE SEVEN FILTER POSITIONS OPERATING IN THE SPECTRAL REGION 701.6 PER CM (14.25 MICROMETERS) THROUGH 1487 PER CM (6.725 MICROMETERS). FOR THE REMAINING FIVE SPECTRAL BANDS THE 13.8-KM RESOLUTION DETECTORS WERE USED. SELECTABLE FRAME SIZE-POSITION AND SCAN DIRECTION WERE ALSO PROGRAMMABLE VIA GROUND COMMAND. FOR THE VAS DEMONSTRATION, 10-BIT REDUCED RESOLUTION (3.5 KM) VISIBLE DATA WERE PROVIDED FOR IMAGING. IN SOME OF THE SPECTRAL REGIONS, MULTIPLE-LINE DATA WERE REQUIRED TO ENHANCE THE SIGNAL-TO-NOISE (S/N) RATIO. TYPICALLY, 167 SATELLITE SPINS AT THE SAME N-TO-S SCAN LINE POSITION WERE REQUIRED TO OBTAIN THE DESIRED SOUNDING DATA. THIS NUMBER OF SPINS PER LINE SHOULD BE ADEQUATE TO OBTAIN SOUNDINGS HAVING A 30- X 30-KM RESOLUTION AND REQUIRE APPROXIMATELY 1.9 MINUTES ON THE AVERAGE. THE MULTISPECTRAL IMAGING (MSI) MODE COULD PROVIDE NORMAL VISSR IR IMAGING PLUS DATA IN ANY TWO SELECTED SPECTRAL BANDS HAVING A SPATIAL RESOLUTION OF 13.8 KM. THIS MODE OF OPERATION TOOK ADVANTAGE OF THE SMALL MERCURY-CADMIUM TELLURIDE DETECTOR OFFSET IN THE N-TO-S PLANE. USING THE DATA FROM THESE DETECTORS SIMULTANEOUSLY PRODUCED A COMPLETE INFRARED MAP WHEN THEY WERE OPERATED EVERY OTHER SCAN LINE. THIS ALLOWED USING THE LARGER DETECTORS DURING HALF OF THE IMAGING/SCANNING SEQUENCE PERIOD TO OBTAIN ADDITIONAL SPECTRAL INFORMATION. UNLIMITED N-TO-S FRAME SIZE AND POSITION SELECTION, WITHIN THE MAXIMUM N-TO-S FOV SCAN DIRECTION, COULD BE SELECTED. VISIBLE DATA WERE NOT AVAILABLE IN THIS MODE SINCE THE VAS WAS CONSTRAINED TO THE LDR SYSTEM. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER,' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. THE VISSR DATA WERE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING. SINCE WALLOPS ISLAND IS COMMITTED TO NOAA OPERATIONAL SUPPORT, DATA FROM THE VAS MSI MODE AND THE BUELL SOUNDING MODE ARE NOT 'STRETCHED.'

***** GOES 5, NESS STAFF *****

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND
TRANSMISSION SYSTEM

NSSDC ID- 81-049A-05

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF

NOAA-NESB

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA-HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED, EARTH-BASED, DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

***** GOES 5, WILLIAMS *****

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 81-049A-02

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - R.N. GRUBB

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE ENERGETIC PARTICLE MONITOR CONSISTED OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITORED PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .67, 400 MEV. THERE WAS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .01, 500 KEV RANGE.

----- GOES 5, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 81-049A-03

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.F. DONNELLY

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTED OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY WERE 0.5 TO 3A, 1.0E-13 J PER 50 CM PER S; AND 1 TO 8A, 1.0E-12 J PER 50 CM PER S; WITH A DYNAMIC RANGE OF 1.E4.

----- GOES 5, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 81-049A-04

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.N. GRUBB
OI - J.C. JOSELYN

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER HAD A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** HAKUCHO*****

SPACECRAFT COMMON NAME- HAKUCHO

ALTERNATE NAMES- COSMIC RADIATION SAT B, COSA-B
11272

NSSDC ID- 79-014A

LAUNCH DATE- 02/21/79
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3C

WEIGHT- 96. KG

SPONSORING COUNTRY/AGENCY
JAPAN

ISAS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96. MIN
PERIAPSIS- 545. KM ALT

EPOCH DATE- 02/22/79
INCLINATION- 29.9 DEG
APOAPSIS- 577. KM ALT

PERSONNEL

PM - M. ODA
PS - S. HAYAKAWA

U OF TOKYO
NAGOYA U

BRIEF DESCRIPTION

THE COSMIC RADIATION SATELLITE, HAKUCHO, HAD THE SHAPE OF AN OCTAGONAL RIGHT PRISM WITH A MAXIMUM WIDTH OF 80 CM AND A HEIGHT OF 65 CM. THE SPACECRAFT WAS SPIN-STABILIZED WITH A SPIN RATE OF 5 RPM. THE SPIN AXIS WAS MANEUVERED BY MEANS OF MAGNETIC TORQUING TOWARDS THE CELESTIAL OBJECTS TO BE OBSERVED. X-RAY DETECTORS LOOKED PARALLEL AND PERPENDICULAR TO THE SPIN AXIS, OBSERVING X-RAY SOURCES OVER A WIDE ENERGY RANGE WITH SHORT TIME RESOLUTION.

----- HAKUCHO, MAKINO-----

INVESTIGATION NAME- DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES

NSSDC ID- 79-014A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - F. MAKINO
PI - Y. TANAKA

NAGOYA U
U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT SURVEYED THE SKY AND MONITORED TRANSIENT SOFT X-RAY SOURCES IN THE ENERGY RANGE 0.1 TO 2 KEV BY MEANS OF GAS-FLOW-TYPE PROPORTIONAL COUNTERS WITH THIN POLYPROPYLENE WINDOWS.

----- HAKUCHO, MIYAMOTO-----

INVESTIGATION NAME- MONITOR OF X-RAY SOURCES

NSSDC ID- 79-014A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - S. MIYAMOTO
PI - Y. OGAWARA
PI - I. KONDO
PI - M. YOSHIMORI
OI - M. INOUE
OI - K. KOYAMA
OI - K. MARISHIMA
OI - M. MATSUOKA
OI - T. HIRAKAWA
OI - T. OHASHI
OI - M. SHIBAZAKI
OI - Y. TANAKA
OI - M. KUNIEDA
OI - F. MAKINO
OI - K. MASAI
OI - F. NAGASE
OI - Y. TANAKA
OI - M. TSUNEMI
OI - K. YAMASHITA

OSAKA U
U OF TOKYO
U OF TOKYO
RIKKYO U
U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO
NAGOYA U
NAGOYA U
NAGOYA U
NAGOYA U
NAGOYA U
OSAKA U
OSAKA U

BRIEF DESCRIPTION

THIS EXPERIMENT LOCATED AND MONITORED X-RAY JUNCT SOURCES AND OTHER VARIABLE X-RAY SOURCES OVER THE ENERGY RANGE 1 TO 100 KEV USING ROTATING MODULATION COLLIMATORS AND OTHER COLLIMATORS.

***** HCNM*****

SPACECRAFT COMMON NAME- HCNM

ALTERNATE NAMES- SATS, APPL EXPL MISSION A
HEAT CAPACITY MAP MSN, AER-A
10R18

NSSDC ID- 78-041A

LAUNCH DATE- 04/26/78
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

WEIGHT- 117. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.7 MIN
PERIAPSIS- 558. KM ALT

EPOCH DATE- 04/27/78
INCLINATION- 97.6 DEG
APOAPSIS- 646. KM ALT

PERSONNEL

MG - D.S. DILLER
SC - R.B. SCHARDT
PM - C.M. MACKENZIE
PS - R.E. MURPHY

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA HEADQUARTERS

BRIEF DESCRIPTION

THE OBJECTIVE OF THE HEAT CAPACITY MAPPING MISSION (HCNM) WAS TO PROVIDE COMPREHENSIVE, ACCURATE, HIGH-SPATIAL-RESOLUTION THERMAL SURVEYS OF THE SURFACE OF THE EARTH. THE SPACECRAFT WAS SPIN STABILIZED AT A RATE OF 14 RPM. THE HCNM CIRCULAR SUN-SYNCHRONOUS ORBIT ALLOWED THE SPACECRAFT TO SENSE SURFACE TEMPERATURE NEAR THE MAXIMUM AND MINIMUM OF THE DIURNAL CYCLE. THE ORBIT HAD AN ASCENDING DAYLIGHT NODE WITH NOMINAL EQUATORIAL CROSSING TIME OF 2:00 PM, AND PROVIDED A 1:30 PM TO 2:30 AM CROSSING TIME OVER MIDDLE NORTHERN LATITUDES. THE ORBIT ALSO ALLOWED FOR REFLECTANCE MEASUREMENTS DURING DAYLIGHT PASSES.

----- HCNM, BARNES-----

INVESTIGATION NAME- HEAT CAPACITY MAPPING RADIOMETER

NSSDC ID- 78-041A-01

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL

PI - M.L. BARNES

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE HEAT CAPACITY MAPPING RADIOMETER (HCNR) WERE AS FOLLOWS: (1) TO PRODUCE THERMAL MAPS AT THE OPTIMUM TIMES FOR MAKING THERMAL-INERTIA STUDIES FOR DISCRIMINATION OF ROCK TYPES AND MINERAL RESOURCES LOCATION; (2) TO MEASURE PLANT-CANOPY TEMPERATURES AT FREQUENT INTERVALS TO DETERMINE THE TRANSPIRATION OF WATER AND PLANT LIFE; (3) TO MEASURE SOIL-MOISTURE EFFECTS BY OBSERVING THE TEMPERATURE CYCLE OF SOILS; (4) TO MAP THERMAL EFFLUENTS, BOTH NATURAL AND MAN-MADE; (5) TO INVESTIGATE THE FEASIBILITY OF GEOTHERMAL SOURCE LOCATION BY REMOTE SENSING; AND (6) TO PROVIDE FREQUENT COVERAGE OF SNOW FIELDS FOR WATER RUNOFF PREDICTION. THE HCNM

TRANSMITTED ANALOG DATA IN REAL TIME TO SELECTED RECEIVING STATIONS. IT WAS DESIGNED TO PROVIDE ACCURATE, HIGH-SPATIAL-RESOLUTION THERMAL MAPS OF THE SURFACE OF THE EARTH AT AN OPTIMUM TIME FOR DETERMINATION OF THERMAL INERTIA. THE HIGH-THERMAL-RESOLUTION DATA WERE ALSO USED TO MAP THERMAL GRADIENTS IN BODIES OF WATER. THE RADIONETER WAS SIMILAR TO THE HIGH-RESOLUTION, SURFACE COMPOSITION MAPPING RADIONETER (HRSMR) OF NIMBUS 5 (72-097A). THE HCRN HAD A SMALL INSTANTANEOUS GEOMETRIC FIELD OF VIEW (LESS THAN 1 BY 1 MILLIRADIANS), HIGH RADIONETRIC ACCURACY, AND A WIDE ENOUGH SWATH COVERAGE ON THE GROUND SO THAT SELECTED AREAS WERE COVERED WITHIN THE 12-H PERIOD CORRESPONDING TO THE MAXIMUM AND MINIMUM OF TEMPERATURE OBSERVED. THE INSTRUMENT OPERATED IN TWO CHANNELS, 10.5 TO 12.5 MICROMETERS (IR) AND 0.8 TO 1.1 MICROMETERS (VISIBLE). THE LATTER CHANNEL WAS MATCHED TO THE ERTS-1 (72-058A) BAND 4. THE INSTRUMENT UTILIZED A RADIATION COOLER TO COOL THE TWO HE-CD-TE DETECTORS TO 100 DEG R. THE EXPERIMENT INCLUDED AN ANALOG MULTIPLIER THAT ACCEPTED THE ANALOG OUTPUTS OF THE DETECTORS AND MULTIPLIED THEM IN A FORM SUITABLE FOR TRANSMISSION BY THE SPACECRAFT S-BAND TRANSMITTER. THE DATA ARE AVAILABLE THROUGH THE EROS DATA CENTER, SIOUX FALLS, SD. MORE COMPLETE INFORMATION CAN BE FOUND IN SMITH, S.R. 'APPLICATIONS EXPLORER MISSIONS (AEM) MISSION PLANNER'S HANDBOOK.'

***** HEAD 2 *****

SPACECRAFT COMMON NAME- HEAD 2
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-B, 1110)
HEAD-B, EINSTEIN

NSSDC ID- 78-103A

LAUNCH DATE- 11/13/78 WEIGHT- 3130. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/14/78
ORBIT PERIOD- 94.0 MIN INCLINATION- 25.5 DEG
PERIAPSIS- 465. NM ALT APOAPSIS- 476. NM ALT

PERSONNEL
MG - R.E. HALPERN NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - J.F. STONE NASA-MSFC
PS - S.S. HOLT NASA-USFC

BRIEF DESCRIPTION

THIS WAS THE SECOND OF THREE MISSIONS IN AN ON-GOING PROGRAM OF RESEARCH IN HIGH-ENERGY ASTRONOMICAL PHENOMENA. THE SPECIFIC OBJECTIVES OF THIS MISSION WERE IMAGING AND SPECTROGRAPHIC STUDIES OF SPECIFIC X-RAY SOURCES AND STUDIES OF THE DIFFUSE X-RAY BACKGROUND. THE SPACECRAFT WAS IDENTICAL TO THE HEAD 1 VEHICLE WITH THE ADDITION OF REACTION WHEELS AND ASSOCIATED ELECTRONICS TO ENABLE THE TELESCOPE TO BE POINTED AT SOURCES TO WITHIN 1 MIN OF ARC. THE INSTRUMENT PAYLOAD WEIGHED 1450 KG. THE MISSION USED A GRAZING-INCIDENCE X-RAY TELESCOPE. FOUR OF THE INSTRUMENTS (HRI, IPC, SSS, FPCS) WERE MOUNTED ON A CAROUSEL ARRANGEMENT AND COULD BE ROTATED INTO THE FOCAL PLANE OF THE TELESCOPE. A LARGE GRAZING-INCIDENCE X-RAY TELESCOPE PROVIDED IMAGES OF SOURCES THAT WERE THEN ANALYZED BY FOUR INTERCHANGEABLE INSTRUMENTS AT THE FOCAL PLANE OF THE TELESCOPE. THE TELESCOPE COLLECTED X RAYS OVER AN ANGULAR RANGE OF APPROXIMATELY 1 DEG X 1 DEG. WITH THE FOCAL PLANE INSTRUMENTS DETERMINING THE LIMITING RESOLUTION FOR EACH MEASUREMENT. THESE INSTRUMENTS INCLUDED A SOLID-STATE SPECTROMETER (SSS), A FOCAL PLANE CRYSTAL SPECTROMETER (FPCS), AN IMAGING PROPORTIONAL COUNTER (IPC), AND A HIGH-RESOLUTION IMAGING DETECTOR (HRI). ALSO INCLUDED WERE A MONITOR PROPORTIONAL COUNTER (MPC) WHICH VIEWED THE SKY ALONG THE TELESCOPE AXIS, BROADBAND FILTER AND OBJECTIVE GRATING SPECTROMETERS THAT COULD BE USED IN CONJUNCTION WITH FOCAL PLANE INSTRUMENTS AND AN ASPECT SYSTEM. THE SCIENTIFIC OBJECTIVES WERE (1) TO ACCURATELY LOCATE AND EXAMINE X-RAY SOURCES IN THE ENERGY RANGE 0.2 TO 4.0 KEV WITH HIGH RESOLUTION; (2) TO PERFORM HIGH-SPECTRAL-SENSITIVITY MEASUREMENTS WITH BOTH HIGH- AND LOW-DISPERSION SPECTROGRAPHS; (3) TO PERFORM HIGH-SENSITIVITY MEASUREMENTS OF TRANSIENT X-RAY BEHAVIOR. THE SPACECRAFT WAS A SIX-SIDED STRUCTURE 5.6 M HIGH AND 2.67 M IN DIAMETER. DOWNLINK TELEMETRY WAS AT A DATA RATE OF 6.5 KB/S FOR REAL-TIME DATA AND 128 KB/S FOR EITHER OF TWO TAPE-RECORDER SYSTEMS. AN ATTITUDE-CONTROL-AND-DETERMINATION SUBSYSTEM WAS USED TO POINT AND MANEUVER THE SPACECRAFT. GYROS, SUN SENSORS, AND STAR TRACKERS WERE EMPLOYED AS SENSING DEVICES.

***** HEAD 2, GIACCONI *****

INVESTIGATION NAME- MONITOR PROPORTIONAL COUNTER (MPC)

NSSDC ID- 78-103A-01 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
ASTRONOMY
HIGH ENERGY ASTROPHYSICS

PERSONNEL
PI - R. GIACCONI
OI - H.D. TANANBAUM
OI - G.W. CLARK
OI - S.S. HOLT
OI - R. NOVICK

JOHNS HOPKINS U
SAO
MASS INST OF TECH
NASA-GSFC
COLUMBIA U

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A PROPORTIONAL COUNTER THAT VIEWED SPACE THROUGH A COLLIMATOR CO-ALIGNED TO THE HIGH-RESOLUTION TELESCOPE. THE SYSTEM HAD AN X-RAY COLLIMATOR, A THERMAL IMPEDANCE COVERING THE SPACECRAFT VIEWING APERTURE, AND AN IN-FLIGHT CALIBRATION SYSTEM. THE ACTIVE AREA WAS 667 50 CM, THE SPATIAL RESOLUTION 1.5 DEG X 1.5 DEG FWHM, AND THE TEMPORAL RESOLUTION 2.56 SEC (1 - 20 KEV).

***** HEAD 2, GIACCONI *****

INVESTIGATION NAME- HIGH-RESOLUTION IMAGER (HRI)

NSSDC ID- 78-103A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI
OI - H.D. TANANBAUM
OI - G.W. CLARK
OI - S.S. HOLT
OI - R. NOVICK

JOHNS HOPKINS U
SAO
MASS INST OF TECH
NASA-GSFC
COLUMBIA U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS EQUIPPED WITH THREE IDENTICAL HRI DETECTORS. THE HRI WAS A DIGITAL X-RAY CAMERA WHICH PROVIDED HIGH SPATIAL AND TEMPORAL RESOLUTION OVER THE CENTRAL 25 ARC MIN OF THE TELESCOPE FOCAL PLANE. IT WAS COMPOSED OF TWO MICROCHANNEL PLATES OPERATING IN CASCADE, A CROSS-GRID CHARGE DETECTOR AND A SET OF ELECTRONICS. IT HAD A SPATIAL RESOLUTION OF 1 ARC SEC, A TEMPORAL RESOLUTION OF 7.8125 MICROSECONDS, AND AN ENERGY RANGE OF .15 - 3.0 KEV. SPECTRAL STUDIES COULD BE PERFORMED USING THE INTERCHANGEABLE BROADBAND FILTER AND THE OBJECTIVE GRATING.

***** HEAD 2, GIACCONI *****

INVESTIGATION NAME- FOCAL PLANE CRYSTAL SPECTROMETER (FPCS)

NSSDC ID- 78-103A-03 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI
OI - H.D. TANANBAUM
OI - G.W. CLARK
OI - S.S. HOLT
OI - R. NOVICK

JOHNS HOPKINS U
SAO
MASS INST OF TECH
NASA-GSFC
COLUMBIA U

BRIEF DESCRIPTION

THE FPCS WAS A CURVED CRYSTAL BRAGG SPECTROMETER WITH A THIN-WINDOW GAS-FILLED PROPORTIONAL COUNTER AS A POSITION-SENSITIVE DETECTOR. THERE WERE TWO IDENTICAL COUNTERS FOR REDUNDANCY, AND SUFFICIENT GAS WAS CARRIED TO COMPENSATE FOR DIFFERENTIAL LEAKAGE THROUGH THE WINDOWS. SIX DIFFERENT CRYSTAL DIFFRACTORS WERE AVAILABLE. THE SPECTROMETER AND DETECTOR HAD AN IMAGING ABILITY WITH AVAILABLE APERTURES OF 3 X 30, 2 X 20, 1 X 20 ARC MIN, AND 6 ARC MIN DIAMETER. THE INSTRUMENT COULD BE OPERATED AS A CONVENTIONAL CURVED-CRYSTAL SPECTROMETER OR USED IN A MODIFIED DEFOCUSSED MODE TO ACHIEVE HIGHER RESOLUTION.

***** HEAD 2, GIACCONI *****

INVESTIGATION NAME- IMAGING PROPORTIONAL COUNTER (IPC)

NSSDC ID- 78-103A-04 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI
OI - H.D. TANANBAUM
OI - G.W. CLARK
OI - S.S. HOLT
OI - R. NOVICK

JOHNS HOPKINS U
SAO
MASS INST OF TECH
NASA-GSFC
COLUMBIA U

BRIEF DESCRIPTION

THE IPC WAS A POSITION-SENSITIVE PROPORTIONAL COUNTER WHICH PROVIDED GOOD EFFICIENCY AND FULL FOCAL PLANE COVERAGE WITH A 75-ARC-MIN X 75-ARC-MIN FOV AND AN EFFECTIVE AREA OF APPROXIMATELY 100 50 CM. IT HAD A SPATIAL RESOLUTION OF 1 ARC MIN, A TEMPORAL RESOLUTION OF 63 MICROSECONDS, AND 32 ENERGY CHANNELS IN THE RANGE OF 0.15 - 4.0 KEV. TWO IDENTICAL COUNTERS WERE INCLUDED FOR REDUNDANCY PLUS A BACKGROUND COUNTER FOR ANTICOINCIDENCE AND AN IN-FLIGHT CALIBRATION SYSTEM.

***** HEAD 3*****

SPACECRAFT COMMON NAME- HEAD 3
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS, 11532

NSSDC ID- 79-082A

LAUNCH DATE- 09/28/79 WEIGHT- 2660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OS5

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/21/79
ORBIT PERIOD- 94.5 MIN INCLINATION- 43.6 DEG
PERIAPSIS- 486.4 KM ALT APOAPSIS- 504.9 KM ALT

PERSONNEL
MG - R.E. HALPERN NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - J.T. STONE NASA-MSFC
PS - T.A. PARNELL NASA-MSFC

BRIEF DESCRIPTION
THIS THIRD MISSION PERFORMED A SKY SURVEY OF GAMMA RAYS AND COSMIC RAYS IN A MANNER SIMILAR TO HEAD 1. IT HAD A HIGHER ORBITAL INCLINATION THAN THE PREVIOUS MISSIONS IN THIS SERIES SINCE THE PAYLOAD CONSISTED PRIMARILY OF COSMIC-RAY INSTRUMENTATION; GREATER COSMIC-RAY FLUX OCCURS NEAR THE EARTH'S MAGNETIC POLES. THE SCIENTIFIC OBJECTIVES OF THE MISSION WERE (1) TO DETERMINE THE ISOTOPIIC COMPOSITION OF THE MOST ABUNDANT COMPONENTS OF THE COSMIC-RAY FLUX WITH ATOMIC MASS BETWEEN 7 AND 56, AND THE FLUX OF EACH ELEMENT WITH ATOMIC NUMBER (2) BETWEEN $Z = 4$ AND $Z = 50$; (3) TO SEARCH FOR SUPER-HEAVY NUCLEI UP TO $Z = 120$, AND MEASURE THE COMPOSITION OF THE NUCLEI WITH $Z \leq 20$; (4) TO STUDY INTENSITY, SPECTRUM, AND TIME BEHAVIOR OF X-RAY AND GAMMA-RAY SOURCES BETWEEN 0.06 AND 10 MEV, AND MEASURE ISOTROPY OF THE DIFFUSE X-RAY AND GAMMA-RAY BACKGROUND; AND (5) TO PERFORM AN EXPLORATORY SEARCH FOR X- AND GAMMA-RAY LINE EMISSIONS. THE NORMAL OPERATING MODE WAS A CONTINUOUS CELESTIAL SCAN ABOUT THE Z AXIS (WHICH NOMINALLY POINTS TO THE SUN).

***** HEAD 3, ISRAEL*****

INVESTIGATION NAME- HEAVY NUCLEI

NSSDC ID- 79-082A-03 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
HIGH ENERGY ASTROPHYSICS
ASTRONOMY

PERSONNEL
PI - M.M. ISRAEL WASHINGTON U
PI - E.C. STONE CALIF INST OF TECH
PI - C.J. WADDINGTON U OF MINNESOTA
OI - M.R. BINNS MCDONNELL-DOUGLAS CORP
OI - J. KLARMANN WASHINGTON U
OI - R.E. VOGT CALIF INST OF TECH

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WAS TO MEASURE THE CHARGE SPECTRUM OF COSMIC-RAY NUCLEI OVER THE NUCLEAR CHARGE RANGE FROM 17 TO 120 IN THE ENERGY INTERVAL 0.3 TO 10 GEV/NUCLEON TO CHARACTERIZE COSMIC RAY SOURCES, PROCESSES OF NUCLEOSYNTHESIS, AND PROPAGATION MODES. THE DETECTOR CONSISTED OF A DOUBLE-ENDED INSTRUMENT OF UPPER AND LOWER HODOSCOPES AND THREE DUAL-GAP ION CHAMBERS. THE TWO ENDS WERE SEPARATED BY A CERENKOV RADIATOR. THE GEOMETRICAL FACTOR WAS 4.50 CM-SR. THE ION CHAMBERS COULD RESOLVE CHARGE TO 0.24 CHARGE UNITS AT LOW ENERGY AND 0.39 CHARGE UNITS AT HIGH ENERGY AND HIGH Z. THE CERENKOV COUNTER COULD RESOLVE 0.3 TO 0.4 CHARGE UNITS.

***** HEAD 3, JACOBSON*****

INVESTIGATION NAME- GAMMA-RAY LINE SPECTROMETER

NSSDC ID- 79-082A-01 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY
X-RAY ASTRONOMY
ASTRONOMY
HIGH ENERGY ASTROPHYSICS

PERSONNEL
PI - A.S. JACOBSON NASA-JPL
OI - J.B. ARNOLD U OF CALIF, SAN DIEGO
OI - A.E. HETZGER NASA-JPL
OI - L.E. PETERSON U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THE BASIC GOALS OF THIS EXPERIMENT WERE TO SEARCH FOR GAMMA-RAY LINE EMISSIONS ARISING FROM A VARIETY OF SOURCE PHENOMENA. PARTICULAR EMPHASIS WAS PLACED ON FINDING LINE EMISSIONS FROM PROCESSES OF NUCLEOSYNTHESIS IN SUPERNOVAE, AND FROM POSITRON-ELECTRON ANNIHILATION AND NUCLEAR REACTIONS IN LOW-ENERGY COSMIC RAYS. IN ADDITION, CAREFUL STUDY WAS MADE OF THE SPECTRAL AND TIME VARIATIONS OF KNOWN HARD X-RAY SOURCES. THE EXPERIMENT WAS CAPABLE OF MEASURING GAMMA-RAY LINES FALLING WITHIN THE ENERGY INTERVAL FROM 0.06 TO 10 MEV, AND WITH AN ENERGY RESOLUTION BETTER THAN 2.5 KEV AT 1.33 MEV AT A LINE SENSITIVITY FROM 1.4-4 TO 1.4-8 PHOTONS/SEC CM/S, DEPENDING ON THE ENERGY. THE EXPERIMENTAL PACKAGE CONTAINED FOUR COOLED DRIFTED GERMANIUM DETECTORS SHIELDED BY CESIUM IODIDE. THE KEY EXPERIMENTAL PARAMETERS WERE (1) GEOMETRY FACTOR OF 11.1 CM CM-SR, (2) A FIELD OF VIEW OF 27 DEG FWHM AND, (3) A TIME RESOLUTION OF LESS THAN 0.1 NS FOR THE GERMANIUM DETECTOR AND 10 NS FOR THE CESIUM IODIDE DETECTOR.

***** HEAD 3, KOCH*****

INVESTIGATION NAME- ISOTOPIIC COMPOSITION OF COSMIC RAYS

NSSDC ID- 79-082A-04 INVESTIGATIVE PROGRAM
CODE SC/CO-OP
INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
HIGH ENERGY ASTROPHYSICS
ASTRONOMY

PERSONNEL
PI - L. KOCH CENS
PI - B. PETERS DANISH SPACE RES INST
OI - J.J. ENGLEMAN CENS
OI - M. CANTIN CENS
OI - A. SOUTOUL CENS
OI - P. MASSE CENS
OI - P. WESTREAU CENS
OI - M. LUND DANISH SPACE RES INST
OI - I. RASMUSSEN DANISH SPACE RES INST
OI - B. BYRNAL DANISH SPACE RES INST
OI - N.J. WESTERGARD DANISH SPACE RES INST
OI - M. ROTHENBERG DANISH SPACE RES INST
OI - V. RIO CENS
OI - N. PETROU CENS
OI - P. GORED CENS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE RELATIVE COMPOSITION OF THE ISOTOPES OF THE PRIMARY COSMIC RAYS BETWEEN BERYLLIUM AND IRON (Z FROM 4 TO 26) AND THE ELEMENTAL ABUNDANCES UP TO Tm (Z=50). CERENKOV COUNTERS AND HODOSCOPES, TOGETHER WITH THE EARTH'S MAGNETIC FIELD, FORMED A SPECTROMETER. THEY DETERMINED CHARGE AND MASS OF COSMIC RAYS TO A PRECISION OF 10 PERCENT FOR THE MOST ABUNDANT ELEMENTS OVER THE MOMENTUM RANGE FROM 2 TO 20 GEV/C.

***** HELIOS-A*****

SPACECRAFT COMMON NAME- HELIOS-A
ALTERNATE NAMES- HELIO-A, PL-701A
HELIOS 1

NSSDC ID- 74-097A

LAUNCH DATE- 12/18/74 WEIGHT- 571.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
FED REP OF GERMANY MWFF
UNITED STATES NASA-OS5

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 01/16/75
ORBIT PERIOD- 198.15 DAYS INCLINATION- 0.62 DEG
PERIAPSIS- 0.3095 AU RAD APOAPSIS- 0.985 AU RAD

PERSONNEL
MG - E.J. MONTAYA NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - A. KUTZER GES FUR WELTRAUMFORSCH
PM - G.W. OUSLEY NASA-GSFC
PS - M. PURSCHE DFVLR
PS - J.W. TRAINOR NASA-GSFC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS ONE OF A PAIR OF DEEP SPACE PROBES DEVELOPED BY THE FEDERAL REPUBLIC OF GERMANY (FRG) IN A COOPERATIVE PROGRAM WITH NASA. EXPERIMENTS WERE PROVIDED BY SCIENTISTS FROM BOTH FRG AND THE U.S. NASA SUPPLIED THE TITAN/CENTAUR LAUNCH VEHICLE. THE SPACECRAFT WAS EQUIPPED WITH TWO ROOMS AND A 32-M ELECTRIC DIPOLE. THE PAYLOAD CONSISTED OF A FLURGATE MAGNETOMETER, ELECTRIC AND MAGNETIC WAVE EXPERIMENTS, WHICH COVERED VARIOUS BANDS IN THE FREQUENCY RANGE 6 HZ TO 3 MHZ; CHARGED-PARTICLE EXPERIMENTS, WHICH COVERED VARIOUS ENERGY RANGES STARTING WITH SOLAR WIND THERMAL ENERGIES AND EXTENDING TO 1 GEV; A ZODIACAL-LIGHT EXPERIMENT; AND A MICRONETEOROID EXPERIMENT. THE PURPOSE OF THE MISSION WAS TO MAKE PIONEERING MEASUREMENTS OF THE INTERPLANETARY MEDIUM FROM THE VICINITY OF THE EARTH'S ORBIT TO 0.3 AU. THE SPIN AXIS WAS NORMAL TO THE ECLIPTIC, AND THE NOMINAL SPIN RATE WAS 1 RPS.

THE OUTER SPACECRAFT SURFACE WAS DIELECTRIC, EFFECTIVELY (BECAUSE OF THE SHEATH POTENTIAL) RAISING THE LOW-ENERGY THRESHOLD FOR THE SOLAR WIND PLASMA EXPERIMENT TO AS HIGH AS 100 EV. ALSO, SHEATH-RELATED COUPLING CAUSED BY THE SPACECRAFT ANTENNAE PRODUCED INTERFERENCE WITH THE WAVE EXPERIMENTS. THE SPACECRAFT WAS CAPABLE OF BEING OPERATED AT BIT RATES FROM 4096 TO 8 BPS, VARIABLE BY FACTORS OF TWO. WHILE THE SPACECRAFT WAS MOVING TO PERIMELION, IT WAS GENERALLY OPERATED FROM 64 TO 256 BPS; AND NEAR 0.3 AU, IT WAS OPERATED AT THE HIGHEST BIT RATE. BECAUSE OF A DEPLOYMENT FAILURE OF ONE AXIS OF THE 32-M, TIP-TO-TIP, DIPOLE ANTENNA, ONE AXIS WAS SHORTED, CAUSING THE ANTENNA TO FUNCTION AS A MONOPOLE. THE MAJOR EFFECT OF THIS ANOMALY WAS TO INCREASE THE EFFECTIVE INSTRUMENT THRESHOLDS, AND TO INTRODUCE ADDITIONAL UNCERTAINTIES IN THE EFFECTIVE ANTENNA LENGTH. INSTRUMENT DESCRIPTIONS WRITTEN BY THE EXPERIMENTERS WERE PUBLISHED (SOME IN GERMAN, SOME IN ENGLISH) IN THE JOURNAL 'RAUMFAHRTFORSCHUNG', VOL. 19, NO. 5, SEPT. 1975.

----- HELIOS-A, FECHTIG-----

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 74-097A-12

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
INTERPLANETARY DUST

PERSONNEL

PI - M.	FECHTIG	MPI-NUCLEAR PHYS
O1 - J.	WEINRAUCH	MPI-PHYS ASTROPHYS

BRIEF DESCRIPTION

THE PURPOSE OF THE EXPERIMENT (E10) WAS TO INVESTIGATE SOME THEORIES ABOUT THE INTERPLANETARY DUST INCLUDING WHETHER OR NOT (1) THE NUMBER OF PARTICLES INCREASES TOWARD THE SUN, (2) THE CUTOFF FOR SMALL PARTICLES IS DEPENDENT ON THE DISTANCE FROM THE SUN, BECAUSE SOLAR PRESSURE INCREASES NEARER THE SUN, AND (3) THE NUMBER DENSITIES OF PARTICLES CHANGE NEAR THE ORBITS OF PLANETS. THE KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/S) CAUSED THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD WAS THEN SEPARATED BY APPROPRIATE VOLTAGES INTO ITS NEGATIVE (ELECTRON) PART AND INTO POSITIVE IONS. THE MASS AND THE ENERGY OF THE DUST PARTICLES WAS DETERMINED FROM THE IMPULSE HEIGHTS. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET ALLOWED THE SMALL ION CLOUD TO BE ANALYZED. IN THIS WAY, THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES BECAME POSSIBLE. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WAS ABOUT 1.E-15 G. MASS AND ENERGY DETERMINATION WAS POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 G. FOR PARTICLES LARGER THAN 1.E-13 G, A MASS SPECTRUM WAS GATHERED. FOR FURTHER DETAILS, SEE PP 262-269 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- SOLAR WIND PLASMA WAVE

NSSDC ID- 74-097A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A.	GURNETT	U OF IOWA
O1 - P.J.	KELLOGG	U OF MINNESOTA
O1 - S.J.	BAUER	NASA-GSFC
O1 - R.G.	STONE	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E5A) SHARED THE 32 M, TIP-TO-TIP ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 16-CHANNEL SPECTRUM ANALYZER WITH APPROXIMATELY LOGARITHMICALLY SPACED CENTER FREQUENCIES, 16 LOG COMPRESSORS, 16 R-C INTEGRATORS FOR AVERAGING THE LOG COMPRESSED ELECTRIC FIELD AMPLITUDE BETWEEN READOUTS, AND 16 PEAK DETECTORS WHICH WERE RESET AFTER READOUT. THE 16 AVERAGES AND 16 PEAK LOG VALUES WERE SAMPLED ALMOST SIMULTANEOUSLY. THE CHANNELS COVERED THE FREQUENCY RANGE OF ABOUT 20 HZ TO 200 KHZ, WITH FOUR CHANNELS PER DECADE OF FREQUENCY. THE LOG COMPRESSORS HAD A DYNAMIC RANGE OF 100 DB. SAMPLING RATE DEPENDENT IN DETAIL ON THE SPACECRAFT BIT RATE AND TELEMETRY FORMAT. THE FASTEST REAL-TIME TELEMETRED RATE WAS FOR 16 AVERAGES AND 16 PEAK VALUES TO BE SAMPLED EVERY 1.325 S. WHENEVER A VERY STRONG SIGNAL WAS DETECTED IN A PRE-SELECTED CHANNEL, THE SNOCK ALARM DATA MODE WAS INITIATED IN WHICH THE ELECTRIC FIELD SPECTRUM, MAGNETIC FIELD, AND PLASMA DATA WERE RECORDED INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND TERMINATING AFTER THE TRIGGERING SIGNAL TIME. THE MAXIMUM SAMPLING RATE OF THE SPECTRUM DATA IN THIS MODE WAS 14.2 SAMPLES PER S FOR EACH CHANNEL. ONE HALF OF THE DIPOLE ANTENNA FAILED TO EXTEND PROPERLY AND WAS SHORT CIRCUITED TO THE SPACECRAFT GROUND. THE RESULTANT CONFIGURATION WAS THAT OF A MONOPOLE WHICH WAS CALCULATED TO HAVE AN EFFECTIVE LENGTH OF APPROXIMATELY 8 M. THE PRIMARY DETRIMENTAL EFFECTS WERE THE LOSS OF 6 DB IN E FIELD SENSITIVITY DUE TO THE SHORTENED ANTENNA AND THE INCREASE IN THE 170 KHZ CHANNEL BY 25 DB. SOLAR CELL AND SHEATH EFFECTS CAUSED INTERFERENCE IN THE LOWEST 6 CHANNELS (WHICH WAS LESS SEVERE WITH INCREASING CHANNEL

FREQUENCY). FOR MORE DETAILS, SEE J. GEOPHYS. RES., 82, P 632, 1975, AND P 245-247 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS

NSSDC ID- 74-097A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A.	GURNETT	U OF IOWA
O1 - P.J.	KELLOGG	U OF MINNESOTA
O1 - S.J.	BAUER	NASA-GSFC
O1 - R.G.	STONE	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E05) SHARED THE 32 M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -06. INSTRUMENTATION CONSISTED OF THREE TUNABLE PLASMA WAVE RECEIVERS, A FIELD-FREQUENCY WIDEBAND RECEIVER, AND A WAVEFORM SAMPLER. THE TUNABLE RECEIVERS AND WIDEBAND RECEIVER PROVIDED DATA FOR DIRECT TELEMETRY TO EARTH. EACH OF THE TUNABLE RECEIVERS COVERED A DIFFERENT FREQUENCY BAND IN THE RANGE 1 HZ TO 200 KHZ. THE HIGH-FREQUENCY RECEIVER HAD 96 FREQUENCY SETTINGS SEPARATED BY ABOUT 4 PERCENT, AND COVERED THE FREQUENCY RANGE 6.4 KHZ TO 200 KHZ. THE MID-RANGE RECEIVER HAD 48 FREQUENCY SETTINGS SEPARATED BY ABOUT 8 PERCENT, AND COVERED THE RANGE 200 HZ TO 6.07 KHZ. THE LOW-FREQUENCY RECEIVER HAD 24 SETTINGS WITH 15 PERCENT SEPARATION, AND COVERED THE RANGE 11 HZ TO 304 HZ. THE RESPONSE TIME OF THE LOW-FREQUENCY RECEIVER WAS APPROXIMATELY 1 S, NECESSITATING THE INCLUSION OF THE WIDEBAND RECEIVER TO OBTAIN INFORMATION ABOUT THE ANGULAR DISTRIBUTION OF WAVES APPEARING IN THE LOW-FREQUENCY BAND. THIS RECEIVER COVERED THE FREQUENCY RANGE 1 HZ TO 200 HZ. THE TIME RESOLUTION DEPENDENT IN DETAIL ON THE SPACECRAFT TELEMETRY FORMAT, BIT RATE, AND EXPERIMENT OPERATIONAL MODE. WHEN THE SNOCK ALARM MODE BECAME ACTIVATED, DATA FROM THE WAVEFORM SAMPLER WERE READ INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE TRIGGERING EVENT. IN THIS MODE, THE INSTANTANEOUS VOLTAGE ACROSS THE ANTENNA WAS PASSED THROUGH A LOW-PASS FILTER WITH CORNER FREQUENCY DEPENDENT ON THE SAMPLING RATE, AND MEASURED AT DISCRETE INTERVALS, THE MOST RAPID BEING 2.2 MS. ONE HALF OF THE ELECTRIC DIPOLE FAILED TO DEPLOY PROPERLY, AND BECAME SHORT-CIRCUITED TO GROUND. THE RESULTING CONFIGURATION WAS THAT OF A MONOPOLE WITH AN OPERATIONAL EFFECTIVE LENGTH OF ABOUT 8 M. THIS RESULTED IN A 6-DB LOSS IN SENSITIVITY, AND AN INCREASED RECEIVER NOISE LEVEL, PARTICULARLY AT LOW FREQUENCIES. IN ADDITION, THE HIGH-GAIN TELEMETRY ANTENNA PRODUCED ADDITIONAL INTERFERENCE. FOR A MORE DETAILED DISCUSSION, SEE P 248 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- 26.5-KHZ TO 3-MHZ RADIO WAVE

NSSDC ID- 74-097A-06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
RADIO PHYSICS
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - D.A.	GURNETT	U OF IOWA
O1 - P.J.	KELLOGG	U OF MINNESOTA
O1 - R.A.	WEBER	NASA-GSFC
O1 - R.G.	STONE	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E5C) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -05. A DUAL (REDUNDANT) 16-FREQUENCY CHANNEL RADIOMETER, WITH APPROXIMATELY LOGARITHMICALLY SPACED CHANNELS, WAS USED TO DETECT TYPE III RADIO EMISSIONS ASSOCIATED WITH SOLAR FLARE EVENTS IN THE FREQUENCY BAND 26.5 KHZ TO 3 MHZ. THE EXPERIMENT SAMPLING RATE WAS SYNCHRONIZED SUCH THAT EACH SPACECRAFT REVOLUTION WAS DIVIDED INTO 32 SECTORS. THE SEQUENCE AND FREQUENCY OF SAMPLING DEPENDENT ON THE INSTRUMENT OPERATIONAL MODE (ONE OF FOUR) AND THE SPACECRAFT BIT RATE. THE MOST RAPID SAMPLING POSSIBLE FOR A SINGLE FREQUENCY CHANNEL WAS ONCE EVERY 1/32 OF A SATELLITE SPIN PERIOD, OR ABOUT .03 S. A TYPICAL SAMPLING SEQUENCE WAS FOR ONE FREQUENCY CHANNEL TO BE SAMPLED FOR 16 SECTORS (1/2 REVOLUTION), FOLLOWED BY THE NEXT. ONE-HALF OF THE 32-M DIPOLE FAILED TO EXTEND PROPERLY DURING DEPLOYMENT, AND WAS SHORTED TO GROUND. THE RESULTANT ANTENNA CONFIGURATION WAS THAT OF A MONOPOLE WITH AN OPERATIONAL EFFECTIVE LENGTH OF ABOUT 8 M. THIS SHORTER CONFIGURATION RESULTED IN INCREASED RADIO-FREQUENCY INTERFERENCE (RFI) OF FROM 3 TO 30 DB ABOVE EXPECTED LEVELS, AND A LOSS OF 6 DB IN GAIN. ANOTHER PROBLEM WAS UNEXPECTED INTERFERENCE WITH THE HIGH-GAIN TELEMETRY ANTENNA. THIS ADDED 60 DB OFI AT 27.5 KHZ, DECREASING WITH INCREASING FREQUENCY, SO THAT ABOVE 200 KHZ IT PRODUCED NO DETECTABLE INTERFERENCE. FOR MORE DETAILS ABOUT THE INSTRUMENT AND MODES OF OPERATION, SEE P 250 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-A, KEPPLER-----

INVESTIGATION NAME- ENERGY ELECTRON AND PROTON DETECTOR

NSSDC ID- 74-097A-10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - E. KEPPLER
OI - B. WILKEN
OI - D.J. WILLIAMS

RPI-ASTRONOMY
MPI-ASTRONOMY
NOAA-ERL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E8) WAS TO STUDY THE ORIGIN AND THE DISTRIBUTION MECHANISM OF LOW-ENERGY ELECTRONS AND PROTONS. THE INSTRUMENT, A MAGNETIC SPECTROMETER, CONSISTED OF SIX SEMICONDUCTOR DETECTORS WITH THE FIELD OF VIEW IN THE PLANE OF THE ECLIPTIC. SPECIES SEPARATION WAS ACHIEVED BY AN INHOMOGENEOUS MAGNETIC FIELD ORIENTED PERPENDICULAR TO THE PARTICLE PATH. FOUR ELECTRON AND TWO PROTON DETECTORS MEASURED ELECTRONS FROM 20 TO 1000 KEV AND PROTONS FROM 80 TO 1000 KEV. THE PROTON MEASUREMENTS WERE MADE WITH A TWO-DETECTOR TELESCOPE EMPLOYING COINCIDENCE AND ANTICOINCIDENCE LOGIC. BOTH PARTICLE SPECIES WERE MEASURED IN 16 ENERGY CHANNELS THROUGH PULSE-HEIGHT ANALYSIS. FOR FURTHER INFORMATION SEE PP 261-263 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-A, KUNDT-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 74-097A-14

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
CELESTIAL MECHANICS

PERSONNEL

PI - W. KUNDT
OI - W.G. MELBOURNE

U OF HAMBURG
NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE TRACKING DATA TO OBTAIN A DETAILED SPACECRAFT ORBIT AND IMPROVED KNOWLEDGE OF THE ORBITAL ELEMENTS OF THE EARTH-MOON SYSTEM AND GENERAL RELATIVITY PARAMETERS.

----- HELIOS-A, KUNOW-----

INVESTIGATION NAME- COSMIC-RAY PARTICLES

NSSDC ID- 74-097A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - M. KUNOW
OI - G.H. WIDDERFENZ
OI - G. GREEN
OI - M. MUELLER-MELLIN
OI - M. WITTE
OI - M. HERPE

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E6) WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .67, 1.3 MEV/NUCLEON, AND ELECTRONS .67, 0.3 MEV WERE MEASURED WITHIN INTERPLANETARY SPACE OVER THE RANGE FROM 0.3 TO 1.0 AU. THE INSTRUMENT, A PARTICLE TELESCOPE WITH A 55-DEG FIELD OF VIEW, CONSISTED OF FIVE SEMICONDUCTOR DETECTORS, ONE SAPPHIRE CERENKOV COUNTER, AND ONE SCINTILLATION COUNTER, ALL ENCLOSED BY AN ANTICOINCIDENCE CYLINDER. THE TELESCOPE WAS CALIBRATED PRIOR TO LAUNCH USING RADIOACTIVE SOURCES, PARTICLE ACCELERATORS, AND GROUND-LEVEL MUONS. IT MEASURED PROTONS AND ALPHA PARTICLES IN SIX CHANNELS (1.3-3.3, 3.3-13, 13-27, 27-37, 37-45, AND .67, 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.6, 0.6-2, 2-3, 3-4, AND .67, 4 MEV). FOR MORE DETAIL SEE PP 253-257 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-A, LEINERT-----

INVESTIGATION NAME- ZODIACAL LIGHT PHOTOMETER

NSSDC ID- 74-097A-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
ZODIACAL LIGHT

PERSONNEL

PI - E. LEINERT
OI - E. PITZ

RPI-ASTRONOMY
MPI-ASTRONOMY

BRIEF DESCRIPTION

THIS EXPERIMENT (E9) CONSISTED OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS OBSERVED THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN UV, BLUE, AND VISUAL BANDS. THE PURPOSE OF THIS EXPERIMENT WAS TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES. FOR FURTHER DETAILS, SEE PP 264-267 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, NESS-----

INVESTIGATION NAME- FLURGATE MAGNETOMETER FOR AVERAGE FIELDS

NSSDC ID- 74-097A-02

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.P. NESS
OI - F. MARIANI
OI - L.P. BURLAGA
OI - S.C. CANTARANO

NASA-GSFC
U OF MOME
NASA-GSFC
CNR, SPACE PLASMA LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (E3) CONSISTED OF A BOOM-MOUNTED, TRIAXIAL-FLURGATE MAGNETOMETER. AN AUTOMATIC IN-FLIGHT RANGE SWITCH SYSTEM SELECTED THE OPTIMUM OF FOUR RANGES THAT WERE MINUS TO PLUS 16, 40, 144, AND 432 NT PER SENSOR. THESE HAD CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.03, 0.09, 0.28, AND 0.84 NT. A SENSOR FLIPPER WAS ACTUATED EVERY 36 H TO ASSIST IN SENSOR ZERO LEVEL DETERMINATION. FOR TELEMETRY BIT RATES ABOVE 256 MPS, VECTOR MEASUREMENTS WERE MADE AT RATES BETWEEN 1 AND 16 PER S, DEPENDING ON BIT RATES. AT LOWER BIT RATES, AVERAGES AND VARIANCES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH.

----- HELIOS-A, NEUBAUER-----

INVESTIGATION NAME- FLURGATE MAGNETOMETER FOR FIELD FLUCTUATIONS

NSSDC ID- 74-097A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - A. MAIER

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THE INSTRUMENT (E2) CONSISTED OF A TRIAXIAL FLURGATE MAGNETOMETER MOUNTED ON A 2.75-M BOOM TO MAKE MAGNETIC FIELD MEASUREMENTS UP TO 4 HZ. DATA FROM EACH AXIS WERE FIRST SENT THROUGH A LOW-PASS FILTER WITH THE 3 DB ATTENUATION POINT AT 4 HZ. DEPENDING ON THE TELEMETRY FORMAT AND BIT RATE, THE DATA WERE FED EITHER INTO A TIME-AVERAGING COMPUTER OR DIRECTLY CONNECTED TO TELEMETRY. A SMOKE IDENTIFICATION COMPUTER TRIGGERED THE STORAGE OF RAPID-RATE DATA IN THE SPACECRAFT MEMORY WHEN THERE WERE DISCONTINUITIES IN THE VARIATIONS OF THE AMBIENT MAGNETIC FIELD. TWO MEASUREMENT RANGES WERE USED, PLUS OR MINUS 100 AND 400 NT WITH RESOLUTIONS OF PLUS OR MINUS 0.2 AND 0.8 NT, RESPECTIVELY. THE INSTRUMENT WAS EQUIPPED WITH A FLIPPER MECHANISM, WHICH RE-ORIENTED EACH SENSOR BY 90 DEG PERIODICALLY. FOR DETAILED INFORMATION, SEE P 232 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, 1975.

----- HELIOS-A, NEUBAUER-----

INVESTIGATION NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- 74-097A-03

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - G. GEMMEL

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT (E4) WAS DESIGNED TO INVESTIGATE THE MAGNETIC COMPONENT OF ELECTROMAGNETIC WAVES IN THE SOLAR WIND FROM 0.3 TO 1.0 AU. BY MEANS OF ITS WAVEFORM CHANNEL (WFC) THE RAPID VARIATIONS OF THE MAGNETIC FIELD WERE MEASURED UP FROM PLUS OR MINUS 0.75 NT TO PLUS OR MINUS 275 NT IN THREE ORTHOGONAL DIRECTIONS FROM 4 TO 126 HZ. A SPECTRUM ANALYZER OBSERVED THE FIELD COMPONENTS IN THE ECLIPTIC PLANE AND PERPENDICULAR TO IT, TO OBTAIN THE POWER SPECTRAL DENSITY AND PEAK VALUES FOR EIGHT LOGARITHMICALLY SPACED CHANNELS IN THE RANGE FROM 4.7 TO 2200 HZ. BECAUSE OF THE LARGE AMOUNT OF DATA PRODUCED BY THIS EXPERIMENT, AN ADAPTIVE DATA REDUCTION WAS APPLIED. FOR INTERESTING TIME INTERVALS SELECTED BY THE FLURGATE MAGNETOMETER (74-097A-01, NEUBAUER) OR GUMMETT (E-04), WAVEFORM DATA COULD BE READ INTO AN ON-BOARD MEMORY AT A RAPID

RATE TO BE TRANSMITTED SLOWLY AFTERWARDS. FOR MORE DETAILED INFORMATION SEE P 241 IN "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, ROSENBAUER-----

INVESTIGATION NAME- PLASMA DETECTORS

NSSDC ID- 74-097A-09

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - M.R. ROSENBAUER
OI - M. PELLKOFER
OI - J.M. WOLFE

MPI-AERONOMY
MPI-ESTHATERN PHYS
NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT (E1) EMPLOYED THREE PLASMA ANALYZERS FOR POSITIVE IONS AND ONE FOR ELECTRONS. ALL DETECTORS WERE MOUNTED NORMAL TO THE SPIN AXIS. POSITIVE IONS WITH ENERGY PER CHARGE WITHIN THE RANGE 0.150 TO 15.32 KEV/B WERE MEASURED IN TWO ANGULAR DIMENSIONS USING A COMBINATION OF A HEMISPHERICAL, A QUADRISPHERICAL, AND A SINUSOIDALLY SHAPED ELECTROSTATIC ANALYZER. ELECTRONS WITH ENERGY FROM 0.5 TO 1660 EV WERE MEASURED WITH A HEMISPHERICAL ELECTROSTATIC ANALYZER IN ONE DIMENSION. THE EXPERIMENT OPERATED IN SEVERAL MODES, WITH DIFFERING TIME RESOLUTION DEPENDING IN DETAIL ON TELEMETRY FORMAT AND SATELLITE BIT RATE. TYPICAL TIME RESOLUTION WAS ON THE ORDER OF A MINUTE. ALSO, WHENEVER THE SPECIAL SHOCK ALARM MODE WAS TRIGGERED BY EXPERIMENTS -04 OR -01, HIGH-TIME-RESOLUTION PLASMA DATA FOR A PERIOD BEFORE AND AFTER THE EVENT WAS RECORDED INTO SPACECRAFT MEMORY FOR LATER TRANSMISSION. BECAUSE THE SPACECRAFT BODY WAS DIELECTRIC, SHEATH POTENTIALS OF UP TO 100 EV DEGRADED THE USEFULNESS OF DATA TAKEN IN THE LOWER ELECTRON-ENERGY CHANNELS. THIS PHENOMENON WAS JUDGED TO HAVE MINIMAL EFFECTS ON THE USEFULNESS OF THE ION DATA. FOR MORE DETAILED INFORMATION SEE P 226 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, TRAINOR-----

INVESTIGATION NAME- GALACTIC AND SOLAR COSMIC RAYS

NSSDC ID- 74-097A-08

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - J.M. TRAINOR
OI - E.C. ROLOF
OI - M.J. TEEBARDEN
OI - F.B. McDONALD
OI - K.G. MCCracken

NASA-GSFC
APPLIED PHYSICS LAB
NASA-GSFC
NASA-GSFC
CSIRO

BRIEF DESCRIPTION

THE DETECTOR COMPLEMENT OF THIS EXPERIMENT (E7) CONSISTED OF THREE SEPARATE DELTA E/Delta X VS E TELESCOPES AND A PROPORTIONAL COUNTER FOR MONITORING SOLAR X-RAYS IN THE RANGE 2-8 KEV. THE HIGH-ENERGY TELESCOPE HAD A GEOMETRIC FACTOR OF 0.22 SQ CM-SR AND MEASURED ELECTRONS IN THREE RANGES BETWEEN 2 AND 8 MEV, AND PROTONS AND ALPHA PARTICLES IN THREE RANGES BETWEEN 20 AND 56 MEV/N. PROTONS ABOVE 230 MEV APE ALSO MEASURED. THE FIRST LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.150 SQ CM-SR) MEASURED PROTONS AND 2 .G1. J PARTICLES IN THREE RANGES BETWEEN 5 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM-SR) MEASURED PROTONS IN SEVERAL RANGES BETWEEN 0.12 AND 2.1 MEV, ALPHA PARTICLES IN THE RANGES 0.6-2.1 AND 6-21.1 MEV/N, AND ELECTRONS IN FOUR RANGES BETWEEN 0.12 AND 2 MEV. FOR A NUMBER OF COINCIDENCE MODES, COUNTING RATE DATA SECTIONED INTO EIGHT 45-DEG SECTORS WERE OBTAINED. THE DATA CYCLE TIME WAS DEPENDENT ON THE SPACECRAFT TELEMETRY RATE (VARIABLE BETWEEN 40% AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER S WERE PULSE-HEIGHT ANALYZED AND THE RATE DATA CYCLE WAS OF THE ORDER OF 5 MIN. AT THE SLOWEST COMBINATION OF BIT RATE AND FORMAT, A COMPLETE DATA CYCLE REQUIRED ABOUT 2.5 H. SEE "IEEE TRANS. ON NUC. SCI.," NS-22, 570, 1975, AND "RAUMFAHRTFORSCHUNG," 19, 5, PP 258-260, 1975, FOR FURTHER DETAILS.

***** MINOTORI*****

SPACECRAFT COMMON NAME- MINOTORI

ALTERNATE NAMES- ASTRONOMICAL SATELLITE-A, ASTRO-A
12587

NSSDC ID- 81-017A

LAUNCH DATE- 02/21/81
LAUNCH SITE- NAGASHIMA, JAPAN
LAUNCH VEHICLE- N-35

WEIGHT- 180. KG

SPONSORING COUNTRY/AGENCY
JAPAN

1545

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.9 MIN
PERIAPSIS- 577. KM ALT

EPOCH DATE- 02/22/81
INCLINATION- 31.4 DEG
APOAPSIS- 603. KM ALT

PERSONNEL

PI - Y. TANAKA
PS - T. SUENOTO

U OF TOKYO
U OF TOKYO

BRIEF DESCRIPTION

THE MAIN OBJECTIVE OF THE ASTRO-A MISSION WAS THE DETAILED STUDY OF SOLAR FLARES DURING SOLAR MAXIMUM. PRINCIPAL INVESTIGATIONS WERE (1) IMAGING OF SOLAR FLARE X RAYS IN THE RANGE 10-40 KEV BY MEANS OF ROTATING MODULATION COLLIMATORS, AND (2) SPECTROSCOPY OF X-RAY EMISSION LINES FROM HIGHLY IONIZED IRON IN SOLAR FLARES IN THE RANGE 1.7-2.0 A BY MEANS OF A BRAGG SPECTROMETER. WAVELENGTH SCANNING WAS ACHIEVED BY THE SPACECRAFT REVOLUTION, WITH AN OFFSET POINTING OF THE SPIN AXIS WITH RESPECT TO THE SUN. INVESTIGATIONS (1) AND (2) EACH HAD A TIME RESOLUTION OF 8 S. IN ADDITION, THE FOLLOWING INVESTIGATIONS WERE INCLUDED: THREE SOLAR FLARE X-RAY MONITORS THAT RECORDED THE TIME PROFILE AND SPECTRUM OF THE X-RAY FLARES IN THE RANGE 3-20 KEV, A SOLAR-FLARE GAMMA-RAY DETECTOR FOR THE RANGE 0.2-9.0 MEV, A PARTICLE DETECTOR THAT MONITORED ELECTRON FLUX ABOVE 100 KEV, AND PLASMA PROBES FOR THE MEASUREMENT OF ELECTRON DENSITY AND TEMPERATURE.

----- MINOTORI, MINAO-----

INVESTIGATION NAME- PLASMA PROBES

NSSDC ID- 81-017A-06

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
SPACE PLASMAS

PERSONNEL

PI - K. MINAO
PI - M. OYA
OI - K. OYARA
OI - T. TAKAHASHI

U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT USED PLASMA PROBES TO MEASURE ELECTRON DENSITY AND ELECTRON TEMPERATURE DURING THE SOLAR MAXIMUM PERIOD.

----- MINOTORI, KONDO-----

INVESTIGATION NAME- SOLAR FLARE GAMMA-RAY DETECTOR IN
0.2-9.0 MEV RANGE

NSSDC ID- 81-017/-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - T. KONDO
PI - K. OKUBAIRA
OI - Y. MURASHIMA
OI - M. YOSHIMORI

U OF TOKYO
RIKKYO U
RIKKYO U
RIKKYO U

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED GAMMA RAYS FROM SOLAR FLARES IN THE ENERGY RANGE 0.2-9.0 MEV WITH A SCINTILLATION COUNTER.

----- MINOTORI, MATSUOKA-----

INVESTIGATION NAME- TIME PROFILE AND SPECTRA OF X-RAY FLARES
IN THE 2-20 KEV RANGE

NSSDC ID- 81-017A-03

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - M. MATSUOKA
OI - K. KUYAMA
OI - M. INOUE
OI - Y. TANAKA

U OF TOKYO
U OF TOKYO
U OF TOKYO
U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT USED A GAS SCINTILLATION PROPORTIONAL COUNTER TO RECORD TIME PROFILES AND SPECTRA OF SOLAR X-RAY FLARES IN THE 2-20 KEV AND ABOVE 20 KEV RANGES.

----- MINOTORI, NISHI-----

INVESTIGATION NAME- SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN
1.7-2.0 A RANGE

NSDDC ID- 01-017A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - K. NISHI U OF TOKYO
OI - T. MORIYAMA U OF TOKYO
OI - K. TANAKA U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT USED A BRAGG SPECTROMETER TO STUDY THE SPECTROSCOPY OF X-RAY EMISSION LINES FROM HIGHLY IONIZED IRON IN SOLAR FLARES. THE SPECTRAL RANGE COVERED WAS 1.7-2.8 A. WAVELENGTH SCANNING WAS ACHIEVED BY SPACECRAFT ROTATION WITH THE SPIN AXIS OFFSET SLIGHTLY FROM THE SUN. THE TIME RESOLUTION WAS 6 S.

----- MINOTORI, TAKAKURA-----

INVESTIGATION NAME- SOLAR FLARE 10-40 KEV X RAYS USING
ROTATING MODULATION COLLIMATOR IMAGING

NSDDC ID- 01-017A-03

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - T. TAKAKURA U OF TOKYO
OI - S. MIYAROTO OSAKA CITY U
OI - Y. OGAWARA U OF TOKYO
OI - K. OKI U OF TOKYO
OI - T. MURAKAMI U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT USED ROTATING MODULATION COLLIMATORS TO IMAGE SOLAR FLARE X-RAYS IN THE ENERGY RANGE OF 10-40 KEV. THE TIME RESOLUTION WAS 6 S.

----- MINOTORI, TAKEUCHI-----

INVESTIGATION NAME- ELECTRON FLUX ABOVE 100 KEV PARTICLE
DETECTOR MONITOR

NSDDC ID- 01-017A-05

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - T. TAKEUCHI INST PHYS + CHEM RES
OI - H. IMAI INST PHYS + CHEM RES

BRIEF DESCRIPTION

THIS EXPERIMENT USED A PAIR OF PROPORTIONAL COUNTERS TO MONITOR SOLAR ELECTRON FLUX ABOVE 100 KEV.

----- IMP-J-----

SPACECRAFT COMMON NAME- IMP-J
ALTERNATE NAMES- PL-723A, IMP B
EXPLORER 50, 6873

NSDDC ID- 73-078A

LAUNCH DATE- 10/26/73 WEIGHT- 371. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OS5

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GECENTRIC
ORBIT PERIOD- 17206. MIN
PERIAPSIS- 141220. KM ALT
APOGEE DATE- 10/29/73
INCLINATION- 26.7 DEG
APOAPSIS- 280940. KM ALT

PERSONNEL

MG - H.B. CHISHOLM NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - J.M. KING NASA-GSFC

BRIEF DESCRIPTION

IMP B (EXPLORER 50), THE LAST SATELLITE OF THE IMP SERIES, WAS A DRUM-SHAPED SPACECRAFT, 135.6 CM ACROSS AND 157.4 CM HIGH. INSTRUMENTED FOR INTERPLANETARY AND MAGNETOTAIL STUDIES OF COSMIC RAYS, ENERGETIC SOLAR PARTICLES, PLASMA, AND ELECTRIC AND MAGNETIC FIELDS. ITS INITIAL ORBIT WAS MORE ELLIPTICAL THAN INTENDED, WITH APOGEE AND PERIGEE DISTANCES OF ABOUT 45 AND 25 EARTH RADII. ITS ECCENTRICITY DECREASED AFTER LAUNCH. THE SPACECRAFT SPIN AXIS WAS NORMAL TO THE ECLIPTIC PLANE, AND THE SPIN RATE WAS 25 RPM. THE DATA TELEMETRY RATE WAS 1600 BPS.

----- IMP-J, AGGSON-----

INVESTIGATION NAME- ELECTROSTATIC FIELDS

NSDDC ID- 73-078A-11

INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - T.L. AGGSON NASA-GSFC
OI - J.D. NEPPNER NASA-GSFC

BRIEF DESCRIPTION

THE INSTRUMENT WAS DESIGNED TO MEASURE AMBIENT ELECTRIC FIELDS IN THE SOLAR WIND AND THE EARTH'S MAGNETOSHEATH UP TO 1 MHz IN FREQUENCY. THE SENSOR CONSISTED OF A PAIR OF 70-CM WIRE ANTENNAS (140 CM TIP-TO-TIP), WHICH WERE HELD RIGID BY CENTRIFUGAL FORCE DUE TO SATELLITE SPIN (ABOUT 24 RPM). THE WIRES WERE INSULATED FROM THE PLASMA, EXCEPT FOR THEIR SHORT OUTER SECTIONS, TO REMOVE THE ACTIVE PROBE AREA FROM THE SPACECRAFT SHEATH. THE ANTENNA SERVED AS A DOUBLE FLOATING PROBE, AND MEASUREMENTS WERE OBTAINED EVERY 1/4 SPACECRAFT REVOLUTION (ABOUT 0.75 S). ULF AND VLF MEASUREMENTS WERE OBTAINED USING SEVEN 60-PERCENT BANDWIDTH FILTERS WITH CENTER FREQUENCIES LOGARITHMICALLY SPACED FROM 1 HZ TO 1 KHZ. THESE FREQUENCY CHANNELS HAD AN INTRINSIC SENSITIVITY OF 1.0E-9 V/CM, AND A PEAK RANGE OF 1.0E-2 V/CM. HOWEVER, THE EFFECTIVE LOW-FREQUENCY FILTER THRESHOLD WAS DETERMINED BY INTERFERENCE DUE TO HARMONICS OF THE SPACECRAFT SPINNING WITHIN AN ASYMMETRIC SHEATH. THE OTHER MAJOR LIMITATION WAS ALSO DUE TO SHEATH EFFECT. WHENEVER THE ELECTRON PLASMA DENSITY WAS LESS THAN ABOUT 10 PARTICLES/CUBIC CM, THE SHEATH OVERLAPPED THE ACTIVE ANTENNA PORTIONS AND PRECLUDED MEANINGFUL MEASUREMENTS OF AMBIENT CONDITIONS.

----- IMP-J, BARE-----

INVESTIGATION NAME- SOLAR PLASMA ELECTROSTATIC ANALYZER

NSDDC ID- 73-078A-10

INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
SOLAR PHYSICS

PERSONNEL

PI - S.J. BARE LOS ALAMOS NAT LAB
OI - J.R. ASBRIDGE LOS ALAMOS NAT LAB

BRIEF DESCRIPTION

A HEMISPHERICAL ELECTROSTATIC ANALYZER MEASURED THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, MAGNETOSHEATH, AND MAGNETOTAIL. IONS AS HEAVY AS OXYGEN WERE RESOLVED WHEN THE SOLAR WIND TEMPERATURE WAS LOW. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RC TIME CONSTANTS. IN THE SOLAR WIND, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOSHEATH, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOTAIL, POSITIVE IONS FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND FROM 100 EV TO 20 KEV (15 PERCENT RESOLUTION) WERE STUDIED.

----- IMP J, BRIDGE-----

INVESTIGATION NAME- SOLAR PLASMA FARADAY CUP

NSDDC ID- 73-078A-02

INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - M.S. BRIDGE MASS INST OF TECH
OI - A.J. LAZARUS MASS INST OF TECH
OI - J.W. MINSACK MASS INST OF TECH
OI - E.W. LYON MASS INST OF TECH

BRIEF DESCRIPTION

A MODULATED SPLIT-COLLECTOR FARADAY CUP, PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, TRANSITION REGION, AND MAGNETOTAIL. ELECTRONS WERE STUDIED IN EIGHT LOGARITHMICALLY EQUISPACED ENERGY CHANNELS BETWEEN 17 EV AND 7 KEV. POSITIVE IONS WERE STUDIED IN EIGHT CHANNELS BETWEEN 50 EV AND 7 KEV. A SPECTRUM WAS OBTAINED EVERY EIGHT SPACECRAFT REVOLUTIONS. ANGULAR INFORMATION WAS OBTAINED IN EITHER 15 EQUALLY SPACED INTERVALS DURING A 360-DEG REVOLUTION OF THE SATELLITE OR IN 15 ANGULAR SEGMENTS CENTERED MORE CLOSELY ABOUT THE SPACECRAFT-SUN LINE.

----- IMP-J, FRANK-----
 INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 73-078A-04 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SPACE PLASMAS

PERSONNEL
 PI - L.A. FRANK U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRA OF LOW-ENERGY ELECTRONS AND PROTONS IN THE GEOCENTRIC RANGE 50 TO 40 R(1) TO GIVE FURTHER DATA ON GEOMAGNETIC STORMS, AURORA, TAIL AND NEUTRAL SHEET, AND OTHER MAGNETOSPHERIC PHENOMENA. THE DETECTOR WAS A DUAL-CHANNEL CURVED-PLATE ELECTROSTATIC ANALYZER (LEPERDEA - LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER) WITH 16 ENERGY INTERVALS BETWEEN 5 E AND 50 KEV. IT HAD AN ANGULAR FIELD OF VIEW OF 9 DEG BY 25 DEG. THE DETECTOR COULD BE OPERATED IN ONE OF TWO MODES: (1) ONE PROVIDING GOOD ANGULAR RESOLUTION (16 DIRECTIONS FOR EACH PARTICLE ENERGY BAND) ONCE EACH 272 S, AND (2) ONE PROVIDING GOOD TEMPORAL RESOLUTION IN WHICH THE ENTIRE ENERGY RANGE IN FOUR DIRECTIONS WAS MEASURED EVERY 60 S.

----- IMP-J, GLOCKLER-----
 INVESTIGATION NAME- SOLID-STATE DETECTORS

NSSDC ID- 73-078A-03 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS

PERSONNEL
 PI - G. GLOCKLER U OF MARYLAND
 OI - C.Y. FAN U OF ARIZONA
 OI - D.K. MOVESTADT MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES OBSERVED DURING SOLAR FLARES AND 27-DAY RECURRENT EVENTS. THE DETECTORS USED INCLUDED (1) AN ELECTROSTATIC ANALYZER (TO SELECT PARTICLES OF THE DESIRED ENERGY PER CHARGE) COMBINED WITH AN ARRAY OF WINDOWLESS SOLID-STATE DETECTORS (TO MEASURE THE ENERGY LOSS) AND SURROUNDED BY AN ANTICOINCIDENCE SHIELDING, AND (2) A THIN-WINDOW PROPORTIONAL COUNTER, SOLID-STATE PARTICLE TELESCOPE. THE EXPERIMENT MEASURED PARTICLE ENERGIES FROM 0.1 TO 10 MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIED POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF 2 FROM 1 TO 6 (NO CHARGE RESOLUTION FOR Z GREATER THAN 8). TWO 1000-CHANNEL PULSE-HEIGHT ANALYZERS, ONE FOR EACH DETECTOR, WERE INCLUDED IN THE EXPERIMENT PAYLOAD.

----- IMP-J, GURNETT-----
 INVESTIGATION NAME- ELECTROSTATIC WAVES AND RADIO NOISE

NSSDC ID- 73-078A-12 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.A. GURNETT U OF IOWA
 OI - T.L. AGGSON NASA-GSFC
 OI - G.W. PFEIFFER U OF IOWA

BRIEF DESCRIPTION

A WIDE-BAND RECEIVER WAS USED TO OBSERVE HIGH-RESOLUTION FREQUENCY-TIME SPECTRA, AND A SIX-CHANNEL NARROW-BAND RECEIVER WITH A VARIABLE CENTER FREQUENCY WAS USED TO OBSERVE WAVE CHARACTERISTICS. THE RECEIVERS OPERATED FROM THREE ANTENNA SYSTEMS. THE FIRST SYSTEM CONTAINED A PAIR OF LONG DIPOLE ANTENNAS (ONE, EXTENDABLE TO ABOUT 124 M, NORMAL TO THE SPACECRAFT SPIN AXIS AND THE OTHER ANTENNA, EXTENDABLE TO ABOUT 6.1 M, ALONG THE SPIN AXIS). THE SECOND SYSTEM CONTAINED A BOOM-MOUNTED TRIAD OF ORTHOGONAL LOOP ANTENNAS. THE THIRD SYSTEM CONSISTED OF A BOOM-MOUNTED .51 M (20 IN.) SPIN-AXIS DIPOLE. THE MAGNETIC AND ELECTRIC FIELD INTENSITIES AND FREQUENCY SPECTRA, POLARIZATION, AND DIRECTION OF ARRIVAL OF NATURALLY OCCURRING RADIO NOISE IN THE MAGNETOSPHERE WERE OBSERVED. PHENOMENA STUDIED WERE THE TIME-SPACE DISTRIBUTION, ORIGIN, PROPAGATION, DISPERSION, AND OTHER CHARACTERISTICS OF RADIO NOISE OCCURRING ACROSS AND ON EITHER SIDE OF THE MAGNETOSPHERIC BOUNDARY REGION. THE FREQUENCY RANGE FOR ELECTRIC FIELDS WAS 0.3 HZ TO 200 KHZ, AND FOR MAGNETIC FIELDS IT WAS 20 HZ TO 200 KHZ.

----- IMP-J, KRINIGIS-----
 INVESTIGATION NAME- CHARGED PARTICLE MEASUREMENTS EXPERIMENT

NSSDC ID- 73-078A-08 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS

PERSONNEL
 PI - S.W. KRINIGIS APPLIED PHYSICS LAB
 OI - T.P. ARMSTRONG U OF KANSAS
 OI - J.A. VAN ALLEN U OF IOWA

BRIEF DESCRIPTION

THREE SOLID-STATE DETECTORS IN AN ANTICOINCIDENCE PLASTIC SCINTILLATOR OBSERVED ELECTRONS BETWEEN 0.2 AND 2.5 MEV; PROTONS BETWEEN 0.3 AND 500 MEV; ALPHA PARTICLES BETWEEN 2.0 AND 200 MEV; HEAVY PARTICLES WITH Z VALUES RANGING FROM 2 TO 5 WITH ENERGIES GREATER THAN 0 MEV; HEAVY PARTICLES WITH Z VALUES RANGING BETWEEN 6 AND 8 WITH ENERGIES GREATER THAN 32 MEV; AND INTEGRAL PROTONS AND ALPHAS OF ENERGIES GREATER THAN 50 MEV/NUCLEON, ALL WITH DYNAMIC RANGES OF 1 TO 1 MILLION (PER 50 CM S SR). FIVE THIN-WINDOW GEIGER-MUELLER TUBES OBSERVED ELECTRONS OF ENERGY GREATER THAN 15 KEV, PROTONS OF ENERGY GREATER THAN 250 KEV, AND α RAYS WITH WAVELENGTHS BETWEEN 2 AND 10 A, ALL WITH A DYNAMIC RANGE OF 10 TO 100 MILLION (PER 50 CM S SR). PARTICLES AND α RAYS, PRIMARILY OF SOLAR ORIGIN, WERE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT ALSO PERMITTED OBSERVATION OF COSMIC RAYS AND MAGNETOTAIL PARTICLES.

----- IMP-J, McDONALD-----
 INVESTIGATION NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 73-078A-09 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS
 COSMIC RAYS

PERSONNEL
 PI - F.B. McDONALD NASA-GSFC
 OI - B.J. TEEGARDEN NASA-GSFC

BRIEF DESCRIPTION

THE GSFC COSMIC-RAY EXPERIMENT WAS DESIGNED TO MEASURE ENERGY SPECTRA, COMPOSITION, AND ANGULAR DISTRIBUTIONS OF SOLAR AND GALACTIC ELECTRONS, PROTONS, AND HEAVIER NUCLEI UP TO Z = 30. THREE DISTINCT DETECTOR SYSTEMS WERE USED. THE FIRST SYSTEM CONSISTED OF A PAIR OF SOLID-STATE TELESCOPES THAT MEASURED INTEGRAL FLUXES OF ELECTRONS ABOVE 150, 350, AND 700 KEV AND OF PROTONS ABOVE .05, .15, .50, .70, 1.0, 1.2, 2.0, 2.5, 5.0, 15, AND 25 MEV. EXCEPT FOR THE .05-MEV PROTON MODE, ALL COUNTING MODES HAD UNIQUE SPECIES IDENTIFICATION. THE SECOND DETECTOR SYSTEM WAS A SOLID-STATE DE/DX-VS-E TELESCOPE THAT LOOKED PERPENDICULAR TO THE SPIN AXIS. THIS TELESCOPE MEASURED Z = 1 TO 16 NUCLEI WITH ENERGIES BETWEEN 4 AND 20 MEV/NUCLEON. COUNTS OF PARTICLES IN THE 0.5- TO 4-MEV/NUCLEON RANGE, WITH NO CHARGE RESOLUTION, WERE OBTAINED AS COUNTS IN THE DE/DX SENSOR BUT NOT IN THE E SENSOR. THE THIRD DETECTOR SYSTEM WAS A THREE-ELEMENT TELESCOPE WHOSE AXIS MADE AN ANGLE OF 39 DEG WITH RESPECT TO THE SPIN AXIS. THE MIDDLE ELEMENT WAS A CSI SCINTILLATOR, WHILE THE OTHER TWO ELEMENTS WERE SOLID-STATE SENSORS. THE INSTRUMENT RESPONDED TO ELECTRONS BETWEEN 2 AND 12 MEV AND TO Z = 1 TO 30 NUCLEI IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON. FOR PARTICLES BELOW 80 MEV, THIS INSTRUMENT ACTED AS A DE/DX DETECTOR. ABOVE 80 MEV, IT ACTED AS A BIDIRECTIONAL TRIPLE DE/DX DETECTOR. FLUX DIRECTIONALITY INFORMATION WAS OBTAINED BY DIVIDING CERTAIN PORTIONS OF THE DATA FROM EACH DETECTOR INTO EIGHT ANGULAR SECTORS.

----- IMP-J, NESS-----
 INVESTIGATION NAME- MAGNETIC FIELD EXPERIMENT

NSSDC ID- 73-078A-01 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - W.F. NESS NASA-GSFC
 OI - C.S. SCARCE NASA-GSFC
 OI - J.B. SEEK NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO STUDY THE INTERPLANETARY AND GEOMAGNETIC TAIL MAGNETIC FIELDS. EACH SENSOR HAD THREE DYNAMIC RANGES, PLUS OR MINUS 12, PLUS OR MINUS 36, AND PLUS OR MINUS 108 NT. WITH THE AID OF A BIT COMPACTION SCHEME (DELTA MODULATION), THERE WERE 25 VECTOR MEASUREMENTS MADE AND TELEMETERED PER SECOND. THE EXPERIMENT OPERATED NORMALLY FROM LAUNCH UNTIL MID-1975. ON JULY 11, 1975, BECAUSE OF A RANGE INDICATOR PROBLEM, THE EXPERIMENT OPERATION WAS FROZEN INTO THE 36-NT RANGE. THE DIGITIZATION ACCURACY IN THIS RANGE IS ABOUT

PLUS OR MINUS 0.3 MV. ON 23 MARCH 1978 THE SENSOR FLIPPER FAILED. AFTER THAT TIME, ALTERNATIVE METHODS OF Z-AXIS SENSOR ZERO-LEVEL DETERMINATION WERE REQUIRED.

----- IMP-J, SIMPSON-----

INVESTIGATION NAME- SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE

NSSDC ID- 75-078A-07

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON
OI - M. GARCIA-MUNOZ

U OF CHICAGO
U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLLINEAR ELEMENTS (THREE SOLID STATE, ONE CSI, AND ONE SAPPHIRE CERENKOV) SURROUNDED BY A PLASTIC ANTICOINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG, FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS, PERMITTING 8-SECTORED INFORMATION ON PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS THROUGH MEASUREMENT OF THE ELECTRONS AND THE ISOTOPE OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG, FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SECTORS.

----- IMP-J, STONE-----

INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPIES

NSSDC ID- 75-078A-06

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - E.C. STONE
OI - R.E. VOGT

CALIF INST OF TECH
CALIF INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIFFERENTIAL ENERGY SPECTRA OF THE ISOTOPE OF HYDROGEN THROUGH OXYGEN FROM 2 TO 40 MEV/NUCLEON, AND OF ELECTRONS FROM 0.2 TO 5 MEV. THE INSTRUMENT CONSISTED OF A STACK OF 11 FULLY DEPLETED SILICON SOLID-STATE DETECTORS SURROUNDED BY A PLASTIC SCINTILLATOR ANTICOINCIDENCE CUP. THE OUTER TWO SOLID-STATE DETECTORS WERE ANNUAL, PERMITTING MEASUREMENTS IN BOTH NARROW-GEOMETRY (TYPICAL GEOMETRIC FACTOR WAS 0.7 SQ CM-SR) AND WIDE-GEOMETRY (TYPICAL GEOMETRIC FACTOR WAS 1.5 SQ CM-SR) COINCIDENCE MODES. ANISOTROPY DATA (45-DEG ANGULAR AND 20-S TEMPORAL RESOLUTION) WERE OBTAINED. FOR FURTHER DETAILS SEE P 931 IN 'ASTROPHYS. J.' 205.

----- IMP-J, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 75-078A-05

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - D.J. WILLIAMS
OI - C.O. ROSTROM
OI - J.N. TRAINOR

NOAA-ERL
APPLIED PHYSICS LAB
NASA-USIC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION WERE (1) TO STUDY THE PROPAGATION CHARACTERISTICS OF SOLAR COSMIC RAYS THROUGH THE INTERPLANETARY MEDIUM OVER THE ENERGY RANGES INDICATED BELOW, (2) TO STUDY ELECTRON AND PROTON FLUXES THROUGHOUT THE GEOMAGNETIC TAIL AND NEAR THE FLANKS OF THE MAGNETOSPHERE, AND (3) TO STUDY THE ENTRY OF SOLAR COSMIC RAYS INTO THE MAGNETOSPHERE. THE INSTRUMENTATION CONSISTED OF A THREE-ELEMENT TELESCOPE EMPLOYING FULLY DEPLETED, SURFACE-BARRIER, SOLID-STATE DETECTORS AND A MAGNET TO DEFLECT ELECTRONS. TWO SIDE-MOUNTED DETECTORS WERE USED TO MEASURE THE DEFLECTED ELECTRONS. TWO ADDITIONAL DETECTORS IN SEPARATE MOUNTS WERE USED TO MEASURE CHARGED PARTICLES ABOVE 15 MEV (1) 2 GREATER THAN OR EQUAL TO 2 ABOVE 0.6 (G1) AND 1.0 MEV (G2), AND 2 GREATER THAN OR EQUAL TO 3 ABOVE 2.0 MEV (G3). THE TELESCOPE MEASURED PROTONS IN THREE RANGES BETWEEN 2.1 AND 25 MEV (L4, L5, L6); 2 GREATER THAN OR EQUAL TO 1 IN THREE RANGES

BETWEEN 0.05 AND 2.1 MEV (L1, L2, L3); ALPHA PARTICLES BETWEEN 2.4 AND 35.0 MEV IN TWO RANGES (L11, L12); 2 GREATER THAN OR EQUAL TO 2 BETWEEN 2.2 AND 8.4 MEV (L10); AND A BACKGROUND CHANNEL (L9). DEFLECTED ELECTRONS WERE MEASURED IN TWO RANGES BETWEEN 30 AND 200 KEV (L7, L8). A COMPLETE DESCRIPTION OF THE INSTRUMENT WAS GIVEN BY D. J. WILLIAMS IN NOAA TECHNICAL REPORT ERL 393-SEL 40, OCT. 1977.

***** INTERCOSMOS 18*****

SPACECRAFT COMMON NAME- INTERCOSMOS 18
ALTERNATE NAMES- 11082, MAGIC
MAG-1K

NSSDC ID- 78-099A

LAUNCH DATE- 10/24/78
LAUNCH SITE- PLESSETSK, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

WEIGHT- KG

SPONSORING COUNTRY/AGENCY
U.S.S.R.

INTERCOS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.4 MIN
PERIAPSIS- 407. KM ALT

EPOCH DATE- 10/25/78
INCLINATION- 83. DEG
APOAPSIS- 768. KM ALT

PERSONNEL

PS - V.V. NIGULIN

IZMIRAN

BRIEF DESCRIPTION

LAUNCHED DURING THE INS PERIOD, THE SPACECRAFT EXPERIMENT OBJECTIVE WAS TO STUDY THE CHARACTER OF THE IONOSPHERE-MAGNETOSPHERE COUPLING BY CONTINUING EXPERIMENTS SIMILAR TO THOSE ON INTERCOSMOS 10. BOTH REAL-TIME AND STORED DATA MODES WERE USED. THE SATELLITE MEASUREMENTS WERE ACCOMPANIED BY SIMULTANEOUS GROUND-BASED, BALLOON, AND BUCKET OBSERVATIONS. THE PARAMETERS WERE GEOMAGNETIC FIELD (3 COMPONENTS), LOW-ENERGY PARTICLE FLUXES AND THEIR ANGULAR DISTRIBUTIONS (ELECTRONS AND POSITIVE IONS, 100 EV TO 50 KEV), VLF WAVES (100 HZ TO 16 KHZ) ELECTRIC AND MAGNETIC COMPONENTS, ELECTROSTATIC FIELDS OF MAGNETOSPHERIC-IONOSPHERIC ORIGIN BY A DOUBLE-PROBE TECHNIQUE (3 COMPONENTS), ELECTRON AND ION DENSITIES AND TEMPERATURES USING SEVERAL TECHNIQUES, AND THE ION AND NEUTRAL COMPOSITION OF THE UPPER ATMOSPHERE. EXPERIMENT PERSONNEL AND DESCRIPTIONS OF THE INSTRUMENTS HAVE BEEN REQUESTED BUT NOT YET RECEIVED.

***** INTERCOSMOS 19*****

SPACECRAFT COMMON NAME- INTERCOSMOS 19
ALTERNATE NAMES- 11285, IONOSONDE-1K
IONO-1K

NSSDC ID- 79-020A

LAUNCH DATE- 02/27/79
LAUNCH SITE- PLESSETSK, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

WEIGHT- 550. KG

SPONSORING COUNTRY/AGENCY
U.S.S.R.

INTERCOS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.8 MIN
PERIAPSIS- 502. KM ALT

EPOCH DATE- 02/28/79
INCLINATION- 74. DEG
APOAPSIS- 566. KM ALT

PERSONNEL

PS - V.V. NIGULIN

IZMIRAN

BRIEF DESCRIPTION

DURING THE INTERNATIONAL MAGNETOSPHERE STUDY PERIOD AN INTERCOSMOS SPACECRAFT, IONOSONDE-1K, WAS LAUNCHED INTO A HIGH INCLINATION, ELLIPTICAL ORBIT WITH A LOW APOGEE. THE MAIN SCIENTIFIC OBJECTIVES OF IONOSONDE-1K WERE (1) THE STUDY OF ELECTRON-DENSITY DISTRIBUTION FROM THE MAIN IONIZATION MAXIMUM OF THE F REGION UP TO THE SATELLITE ALTITUDE WITH A TOPSIDE SOUNDER, AND THE CORRELATION OF THE TIME AND SPACE VARIATIONS WITH SOLAR ACTIVITY, CORPUSCULAR FLUXES AND OTHER GEOPHYSICAL PHENOMENA, (2) GLOBAL MAPPING OF BASIC IONOSPHERIC PARAMETERS AND CONSTRUCTION OF A TOPSIDE IONOSPHERE MODEL, (3) THE STUDY OF WAVE PROCESSES IN MAGNETOSPHERIC PLASMA IN THE FREQUENCY RANGE 100 HZ TO 5 MHZ, (4) THE STUDY OF TIME AND SPACE VARIATIONS OF EMISSIONS IN THE 6300-6564 A BANDS AND 5014 A AND 5577 A LINES, (5) THE STUDY OF TIME AND SPACE VARIATIONS OF CHARGED PARTICLES WITH ENERGIES BETWEEN 10 EV AND 50 MEV AND THEIR IONOSPHERIC EFFECT, AND (6) THE STUDY OF TIME AND SPACE VARIATIONS OF LOCAL ELECTRON AND ION DENSITIES AND TEMPERATURES. THE PROGRAM INCLUDED SIMULTANEOUS GROUND-BASED OBSERVATIONS AT IONOSPHERIC AND SOLAR STATIONS OF THE USSR AND SOCIALIST COUNTRIES. EXPERIMENT INFORMATION HAS BEEN REQUESTED BUT HAS NOT BEEN SUPPLIED.

***** ISEE 1*****

SPACECRAFT COMMON NAME- ISEE 1
ALTERNATE NAMES- IMP-K, 10422
MOTHER, INTNL SUN EARTH EXPL-A
ISEE-A

NSSDC ID- 77-102A

LAUNCH DATE- 10/22/77 WEIGHT- 340.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/23/77
ORBIT PERIOD- 3446.4 MIN INCLINATION- 28.7 DEG
PERIAPSIS- 281. KM ALT APOAPSIS- 138120. KM ALT

PERSONNEL
MG - H.B. CHISHOLM NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - K.W. OGILVIE NASA-GSFC
MU - R.C. WALLS NASA-GSFC

BRIEF DESCRIPTION
THE EXPLORER CLASS MOTHER SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE 1, 2, AND 3). THE PURPOSES OF THE MISSION WERE (1) TO INVESTIGATE SOLAR/TERRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR THE EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTED OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE TO 23 EARTH RADII. THE SPACECRAFT MAINTAINED A SMALL SEPARATION DISTANCE, AND MADE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE. THE SPIN RATE WAS SET AT 19.75 RPM, DIFFERING SLIGHTLY FROM THAT OF THE ISEE 2 SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 1, ANDERSON-----

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102A-10 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K.A. ANDERSON U OF CALIF, BERKELEY
OI - C.L. MENG APPLIED PHYSICS LAB
OI - F.V. CORONITI U OF CALIF, LA
OI - J.M. BOSQUED CESR
OI - R. PELLAT CTR FOR THEORETIC PHYS
OI - G.K. PARKS U OF WASHINGTON
OI - R.P. LIN U OF CALIF, BERKELEY
OI - H. REME CESR

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO DETERMINE, BY USING IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL EXTENT, PROPAGATION VELOCITY, AND TEMPORAL BEHAVIOR OF A WIDE VARIETY OF PARTICLE PHENOMENA. ELECTRONS WERE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS: 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS WERE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS: 8 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 380 KEV. THE 30 KEV THRESHOLD COULD BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTED OF A PAIR OF SURFACE-BARRIER, SEMICONDUCTOR-DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND FOUR FIXED-VOLTAGE CYLINDRICAL ELECTROSTATIC ANALYZERS (TWO FOR ELECTRONS AND TWO FOR PROTONS). CHANNEL MULTIPLIERS WERE USED AS DETECTORS WITH THE FIXED-VOLTAGE ANALYZERS. THE TELESCOPES HAD A VIEWING CONE WITH HALF ANGLE 40 DEG, ORIENTED AT ABOUT 20 DEG TO THE SPIN AXIS.

----- ISEE 1, BAME-----

INVESTIGATION NAME- FAST PLASMA AND SOLAR WIND IONS

NSSDC ID- 77-102A-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS NAT LAB
OI - H. MUGGENRIEDER	MPI-EXTRATERR PHYS
OI - K. SCHINDLER	MUHR-U BOCHUM
OI - J.R. ASBRIDGE	LOS ALAMOS NAT LAB
OI - H.R. ROSENBAUER	MPI-AERONOMY
OI - H. VOLK	MPI-NUCLEAR PHYS
OI - M.D. MONTGOMERY	LOS ALAMOS NAT LAB
OI - G. PASCHMANN	MPI-EXTRATERR PHYS
OI - W.C. FELDMAN	LOS ALAMOS NAT LAB
OI - E.W. HONES, JR.	LOS ALAMOS NAT LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED, IN CONJUNCTION WITH A SIMILAR INSTRUMENT PROVIDED BY G. PASCHMANN OF MAX PLANCK INSTITUTE FOR FLIGHT ON THE DAUGHTER SPACECRAFT, TO STUDY THE PLASMA VELOCITY DISTRIBUTION AND ITS SPATIAL AND TEMPORAL VARIATIONS IN THE SOLAR WIND, BOW SHOCK, MAGNETOSHEATH, MAGNETOPAUSE, MAGNETOTAIL, AND MAGNETOSPHERE. PROTONS FROM 50 EV TO 40 KEV AND ELECTRONS FROM 5 EV TO 20 KEV WERE MEASURED IN ONE, TWO, AND THREE DIMENSIONS BY THREE 90-DEG SPHERICAL ELECTROSTATIC ANALYZERS. THE EXPERIMENT, WHICH UTILIZED CHANNELPROM ELECTRON MULTIPLIERS AS DETECTORS, OPERATED IN TWO RANGES, WITH ENERGY RESOLUTION FOR SEVERAL STEPS IN EACH RANGE OF 10 PERCENT OF THE CENTER ENERGY LEVEL.

----- ISEE 1, CLINE-----

INVESTIGATION NAME- GAMMA-RAY BURSTS

NSSDC ID- 77-102A-14 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - T.L. CLINE NASA-GSFC
OI - D.K. HOVESTADT MPI-EXTRATERR PHYS
OI - B.J. TEEGARDEN NASA-GSFC
OI - G. GLOECKLER U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS. TWO SENSORS WERE USED: A 4-CM DIAM CESIUM IODIDE SCINTILLATOR SYSTEM AND A 6-SQ CM SOLID-STATE (CADMIUM TELLURIDE) ARRAY. AN INTENSITY INCREASE IN EITHER OF THE SENSORS COULD CAUSE A TRIGGER TO OCCUR, FREEZING THE CIRCULATING MEMORY OF THE IMMEDIATE PAST COUNTING RATE HISTORY AND FILLING ANOTHER MEMORY WITH THE COUNTING RATES FOR 1 MIN FOLLOWING THE TRIGGER. THE TIME OF THE TRIGGER AND ITS LOCATION IN THE TEMPORAL HISTORY WERE ALSO STORED IN MEMORY. ALL STORED INFORMATION WAS THEN READ OUT AT A VERY LOW BIT RATE DURING THE SUCCEEDING SEVERAL HOURS. THREE TRIGGERS WERE USED BASED ON TOTAL COUNTS IN 4 MS, 32 MS, AND 256 MS. SIX MEMORIES WERE USED, THREE BEFORE AND THREE AFTER THE TRIGGER, YIELDING STORAGE OF 1/64, 1/8, AND 1 MIN OF DATA EACH TO PROVIDE DETAILED RISE-TIME INFORMATION.

----- ISEE 1, FRANK-----

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- 77-102A-03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL
PI - L.A. FRANK U OF IOWA
OI - V.M. VASYLIUNAS MPI-AERONOMY
OI - C.F. KENNEL U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL AND TEMPORAL VARIATIONS OF THE SOLAR WIND AND MAGNETOSHEATH ELECTRONS AND IONS. PROTONS AND ELECTRONS IN THE ENERGY RANGE FROM 1 EV TO 45 KEV WERE MEASURED IN 64 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION ($\Delta E/E$) OF 0.16. A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA), EMPLOYING SEVEN CONTINUOUS CHANNEL ELECTRON MULTIPLIERS IN EACH OF ITS TWO CONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS WAS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE 4 PI-SR SOLID-ANGLE WAS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE WAS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR WAS SENSITIVE TO ELECTRONS WITH E GREATER THAN OR EQUAL TO 45 KEV, AND PHOTONS WITH E GREATER THAN OR EQUAL TO 600 KEV.

----- ISEE 1, GURNETT-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 77-102A-07

INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT	U OF IOWA
O1 - F.L. SCARF	TRW SYSTEMS GROUP
O1 - R.W. FREDERICKS	TRW SYSTEMS GROUP
O1 - E.J. SMITH	NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, IN CONJUNCTION WITH A SIMILAR (BUT SIMPLER) EXPERIMENT ON ISEE 2, WAS DESIGNED TO MEASURE WAVE PHENOMENA OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND. THREE ELECTRIC DIPOLE ANTENNAS AND A TRIAXIAL SEARCH-COIL ANTENNA WERE USED. THE INSTRUMENTATION CONSISTED OF FOUR MAIN ELEMENTS: (1) A NARROW-BAND SWEEP-FREQUENCY RECEIVER WITH 32 FREQUENCY STEPS IN EACH OF FOUR BANDS FROM 100 HZ TO 400 KHZ. A COMPLETE SWEEP REQUIRED 23 S; (2) A HIGH-TIME-RESOLUTION SPECTRUM ANALYZER WITH 20 CHANNELS FROM 5.62 HZ TO 311 KHZ FOR ELECTRIC FIELD AND 14 IDENTICAL CHANNELS FROM 5.62 HZ TO 10 KHZ FOR MAGNETIC FIELD INFORMATION. THE ELECTRIC AND MAGNETIC CHANNELS WERE SAMPLED SIMULTANEOUSLY; (3) A WAVE-NORMAL ANALYZER TO PROVIDE COMPONENTS FOR COMPUTING THE WAVE NORMAL AND THE POYNTING FLUX. THIS ANALYZER HAD A 10 HZ BANDWIDTH, AND COVERED 32 FREQUENCIES FROM 100 HZ TO 5 KHZ; AND (4) A WIDE-BAND RECEIVER TO CONDITION ELECTRIC AND MAGNETIC WAVEFORMS FOR TRANSMISSION TO THE GROUND VIA THE SPECIAL-PURPOSE ANALOG TRANSMITTER. THIS RECEIVER ALSO PROVIDED THE SIGNALS FOR LONG-BASELINE-INTERFEROMETER MEASUREMENTS BETWEEN ISEE 1 AND ISEE 2. THERE WERE TWO BASIC FREQUENCY CHANNELS: 10 HZ TO 1 KHZ AND 650 HZ TO 10 OR 40 KHZ. IN ADDITION, THE FREQUENCY RANGE COULD BE SHIFTED BY A FREQUENCY-CONVERSION SCHEME TO ANY OF 8 RANGES UP TO 2 MHZ.

----- ISEE 1, HARVEY-----

INVESTIGATION NAME- PLASMA DENSITY

NSSDC ID- 77-102A-08

INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMA
PARTICLES AND FIELDS

PERSONNEL

PI - C.C. HARVEY	PARIS OBSERVATORY
O1 - M. PETIT	CNET
O1 - J.R. MCAFEE	NOAA-ERL
O1 - D. JONES	BRITISH ANTARCTIC SURV
O1 - J.W. ETCHECO	CNET
O1 - R.J.L. GRARD	ESA-ESTEC
O1 - R.E. GENDRIN	CNET

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE PLASMA ELECTRON DENSITY NEAR THE MOTHER SATELLITE AND ALSO THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER SPACECRAFT. THE EXPERIMENT CONSISTED OF TWO DISTINCT PARTS: (1) THE MOTHER SPACECRAFT CARRIED AN EXPERIMENT (THE SOUNDER) TO DETECT RESONANCES OF THE AMBIENT PLASMA. AFTER AN ANTENNA HAD BEEN MOMENTARILY EXCITED AT ONE OF THE CHARACTERISTIC FREQUENCIES OF THE PLASMA IN WHICH IT WAS IMMersed, A PRONOUNCED 'RINGING' WAS OBSERVED. THESE RESONANCES OCCUR AT THE PLASMA FREQUENCY, THE UPPER HYBRID RESONANCE, THE CYCLOTRON FREQUENCY AND ITS HARMONICS; AND THE MEASUREMENT OF THEIR FREQUENCIES PERMITTED THE DETERMINATION OF SEVERAL PLASMA PARAMETERS, INCLUDING THE ELECTRON DENSITY. IN THIS EXPERIMENT, THE TRANSMITTER WAS DESIGNED TO STEP THROUGH 128 SUB-BANDS, COVERING THE CHARACTERISTIC RESONANCE FREQUENCIES OF THE PLASMA, FROM 0.3 TO 50.9 KHZ, AND FROM 0 TO 353 KHZ. (2) THE INTEGRATED DENSITY BETWEEN THE MOTHER AND THE DAUGHTER WAS OBTAINED FROM A SECOND EXPERIMENT (THE PROPAGATION EXPERIMENT) THAT MEASURED THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 683 KHZ TRANSMITTED FROM THE MOTHER AND RECEIVED ON THE DAUGHTER (EXPERIMENT 6). THE PHASE WAS COMPARED AGAINST A PHASE-COHERENT SIGNAL TRANSMITTED FROM THE MOTHER TO THE DAUGHTER BY MODULATION ONTO A CARRIER OF FREQUENCY HIGH ENOUGH TO BE UNAFFECTED BY THE AMBIENT PLASMA (272.5 MHZ). DUE TO PERTURBATIONS TO OTHER EXPERIMENTS, ACTIVE OPERATION WAS ON A LIMITED-DUTY CYCLE.

----- ISEE 1, HELLIWELL-----

INVESTIGATION NAME- VLF WAVE PROPAGATION

NSSDC ID- 77-102A-13

INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
INTERPLANETARY PHYSICS

PERSONNEL

PI - R.A. HELLIWELL	STANFORD U
O1 - T.F. BELL	STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS INTENDED TO PROVIDE DATA TO STUDY INTERACTIONS BETWEEN DISCRETE VLF WAVES AND ENERGETIC PARTICLES IN THE MAGNETOSPHERE. THE VLF WAVES WERE PRODUCED BY A GROUND-BASED TRANSMITTER. INJECTION OF THE WAVE BEYOND THE IONOSPHERE WAS ASSURED BY TRANSMITTER LOCATION IN A REGION WHERE THE MAGNETIC LINES OF FORCE ARE OPEN: IN THIS CASE, SIMPLE STATION, ANTARCTICA. THE INJECTED SIGNAL AND ANY STIMULATED VLF EMISSIONS WERE RECORDED THROUGH A LOOP ANTENNA BY A 1- TO 32-KHZ BROADBAND RECEIVER ON THE SATELLITE. THE OBSERVED PARAMETERS WERE INTENSITY OF RECEIVED RADIO FREQUENCY AS A FUNCTION OF TIME.

----- ISEE 1, HEPPNER-----

INVESTIGATION NAME- DC ELECTRIC FIELD

NSSDC ID- 77-102A-11

INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J.P. HEPPNER	NASA-GSFC
O1 - T.L. AGGSON	NASA-GSFC
O1 - M.C. MAYNARD	NASA-GSFC
O1 - D.A. GURNETT	U OF IOWA
O1 - D.P. CAUFFMAN	LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS INTENDED TO STUDY QUASISTATIC ELECTRIC FIELDS AND LOW-FREQUENCY PLASMA WAVES IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE DOUBLE-PROBE, FLOATING-POTENTIAL TECHNIQUE WAS APPLIED USING LONG-WIRE ANTENNA PROBES WITH AN EFFECTIVE ELECTRIC FIELD BASELINE OF 179 METERS. THE DC DIFFERENTIAL VOLTAGE WAS MEASURED 8 OR 32 TIMES PER S, DEPENDING ON BIT RATE. IN ADDITION, THE DC FIELD WAS MEASURED AT SELECTED AZIMUTHAL ANGLES RELATIVE TO THE SUN AND THE MAGNETIC FIELD, AND THE PEAK VALUE OF DELTA V AND ITS AZIMUTHAL ANGLES WERE MEASURED. LOW-FREQUENCY WAVES WERE MEASURED IN 8 FREQUENCY BANDS AS FOLLOWS - 0.19 TO 0.6, 0.6 TO 1.9, 1.9 TO 6, 6 TO 19, 19 TO 60, 60 TO 190, 190 TO 600, AND 600 TO 1900 HZ. DC-MODE MEASUREMENTS HAD A TWO-STEP VARIABLE GAIN AMPLIFIER CONTROLLED FROM THE GROUND. THE RESOLUTION IN THE HIGHEST GAIN STATE WAS 0.0005 MV/M. THE AC MEASUREMENT ELECTRONICS CONSISTED OF TWO AMPLIFIER SECTIONS. ONE AMPLIFIER WAS USED FOR LOW-FREQUENCY CHANNELS, AND ONE FOR HIGH-FREQUENCY CHANNELS. GAIN LINES FOR EACH AMPLIFIER WERE CONTROLLABLE INDEPENDENTLY FROM THE GROUND. IN THE HIGHEST-GAIN MODE, EACH ANALYZER CHANNEL HAD A SENSITIVITY OF 0.04 MICROVOLTS/M RMS. THE EXPERIMENT COULD BE RUN IN EITHER A SUN-SENSOR SYNCHRONIZED OR A FREE STATE AS CONTROLLED FROM THE GROUND. IN ADDITION, THE AC PORTION COULD BE RUN IN AN AVERAGING MODE, OR AN ALTERNATING AVERAGING AND PEAK-AMPLITUDE-DETECTION MODE KEYED TO THE TELEMETRY READOUT SEQUENCE.

----- ISEE 1, HOVESTADT-----

INVESTIGATION NAME- LOW-ENERGY COSMIC RAYS

NSSDC ID- 77-102A-05

INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - D.K. HOVESTADT	MPI-EXTRATERR PHYS
O1 - J.J. O'GALLAGHER	U OF MARYLAND
O1 - M. SCHOLER	MPI-EXTRATERR PHYS
O1 - L.A. FISK	U OF NEW HAMPSHIRE
O1 - C.V. FAN	U OF ARIZONA
O1 - G. GLOECKLER	U OF MARYLAND

BRIEF DESCRIPTION

THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, WAS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/NUCLEON TO 80 MEV/NUCLEON, AND ELECTRONS IN FOUR CONTIGUOUS BANDS FROM 75 TO 1300 KEV. AT THE LOWER ENERGIES, CHARGE STATES OF HEAVY IONS IN THE HIGH-SPEED (GREATER THAN 500 KM/S) SOLAR WIND WERE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS WERE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE WAS POSSIBLE. THE INSTRUMENT CONSISTED OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) WAS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE WAS APPROXIMATELY 3 TO 560 KEV/Q. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) WAS A DE/DX - E THIN-WINDOW, FLOW-THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZER (ULTRALOW-ENERGY Z, E, AND Q) WAS A COMBINATION OF AN ELECTROSTATIC ANALYZER AND A DE/DX - E SYSTEM WITH A THIN-WINDOW PROPORTIONAL COUNTER AND A POSITION-SENSITIVE SOLID STATE DETECTOR. THE ENERGY RANGE WAS 0.4 TO 6 MEV/NUCLEON.

DATA COULD BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 1, MOZER-----

INVESTIGATION NAME- QUASI-STATIC ELECTRIC FIELDS

NSSDC ID- 77-102A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - F.S. MOZER
OI - M.C. KELLEY

U OF CALIF, BERKELEY
CORNELL U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE QUASI-STATIC ELECTRIC FIELD IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE 8-CM-DIAM SPHERES WERE SEPARATED BY 73.5 M AND WERE POSITIONED IN THE SATELLITE SPIN PLANE. TO ATTEMPT TO OVERCOME THE SPACECRAFT SHEATH (A POTENTIAL PROBLEM WHICH PLAGUES ALL ELECTRIC FIELD DETECTORS), AN ELECTROM GUN WAS INCLUDED ON THE SPACECRAFT BODY. THE INSTRUMENT WAS DESIGNED TO BE SENSITIVE TO FIELDS FROM 0.1 TO 200 MILLIVOLTS/M IN THE FREQUENCY BAND OF 0 TO 12 HZ. THE EXPERIMENT ALSO MEASURED THE ELECTRIC FIELD COMPONENT OF WAVES AT FREQUENCIES LESS THAN 1000 HZ.

----- ISEE 1, OGILVIE-----

INVESTIGATION NAME- FAST ELECTRONS

NSSDC ID- 77-102A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - K.W. OGILVIE
OI - J.D. SCUDDER

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT STUDIED THE TRANSPORT COEFFICIENTS OF TURBULENCE IN THE COLLISIONLESS PLASMA REPRESENTED BY THE INTERPLANETARY MEDIUM AND MAGNETOSHEATH, LOW-ENERGY SOLAR ELECTRON EVENTS, AND BOW-SHOCK-ASSOCIATED ELECTRONS. TWO TRIAXIAL SYSTEMS OF 127-DEG CYLINDRICAL ELECTROSTATIC ANALYZERS WERE USED TO MAKE THREE-DIMENSIONAL MEASUREMENTS OF THE ELECTRON DISTRIBUTION FUNCTION. THERE WERE THREE MODES OF OPERATION, WITH THE FOLLOWING NOMINAL ENERGY RANGES: SOLAR WIND, 7 TO 500 EV; MAGNETOSHEATH, 10 EV TO 2 KEV; AND MAGNETOTAIL AND SOLAR, 105 EV TO 7.05 KEV. ENERGY RESOLUTION (DELTA E/E) WAS 0.07. THE ENTIRE SET OF SIX SIMULTANEOUS SPECTROMETER MEASUREMENTS WAS TAKEN WHILE THE SATELLITE ROTATED THROUGH 60 DEG. EACH SPECTROMETER CONSISTED OF A CURVED-PLATE ANALYZER AND TWO CHANNELTRON DETECTORS.

----- ISEE 1, RUSSELL-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-102A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL
OI - R.L. MCPHERRON
OI - P.C. HEDGECK
OI - E.W. GREENSTADT
OI - M.G. KIVELSON

U OF CALIF, LA
U OF CALIF, LA
IMPERIAL COLLEGE
TRW SYSTEMS GROUP
U OF CALIF, LA

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD WERE ENCLOSED IN A FLIPPER MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT WAS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAD TWO OPERATING RANGES OF PLUS OR MINUS 8192 NT AND PLUS OR MINUS 256 NT IN EACH VECTOR COMPONENT. THE DATA WERE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE WERE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION, 16-BIT SAMPLES OF DATA WERE TRANSMITTED. THIS PROVIDED A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 NT OR 1/128 NT IN THE LOW- AND HIGH-SENSITIVITY RANGES. IN THE SINGLE-PRECISION MODE, ANY 8 CONSECUTIVE BITS OF THE ABOVE 16 BITS WERE SELECTED BY GROUND COMMAND FOR TRANSMISSION AND THE TELEMETRY BANDWIDTHS OF THE MAGNETOMETER WERE DOUBLED. THIS BANDWIDTH VARIED FROM 2 HZ AT THE LOW-TELEMETRY-RATE, DOUBLE-PRECISION EXPERIMENT MODE TO 32 HZ AT THE HIGH-TELEMETRY-RATE, SINGLE-PRECISION EXPERIMENT MODE.

----- ISEE 1, SHARP-----

INVESTIGATION NAME- ION COMPOSITION

NSSDC ID- 77-102A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - R.D. SHARP
OI - G. HAERENDEL
OI - H.R. ROSENBAUER
OI - R.G. JOHNSON
OI - E.G. SHELLEY
OI - J. GEISS
OI - P.X. EBERHARDT
OI - M. BALSIGER
OI - C.R. CHAPPELL
OI - A. GHIELMETTI
OI - D.T. YOUNG

LOCKHEED PALO ALTO
MPI-EXTRATERR PHYS
MPI-AERONOMY
LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
U OF BERNE
U OF BERNE
U OF BERNE
NASA-GSFC
U OF BERNE
U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE ION COMPOSITION AND ENERGY SPECTRA OF THE PLASMA WITHIN THE MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND, AND TO DETERMINE THE ANGULAR DISTRIBUTION OF THE PLASMA IN THE MAGNETOSHEATH. AN ENERGETIC ION MASS SPECTROMETER WAS FLOWN THAT HAD AN ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL, ELECTROSTATIC/MAGNETIC MASS ANALYZER. A COMBINATION OF ELECTRON MULTIPLIERS WAS USED AS THE DETECTOR. THE ENERGY-PER-UNIT-CHARGE RANGE MEASURED WAS FROM 0 TO 17 KEV/Q. THE MASS-PER-UNIT-CHARGE RANGE MEASURED EXTENDED FROM 1 TO GREATER THAN 150 U/Q.

***** ISEE 2*****

SPACECRAFT COMMON NAME- ISEE 2

ALTERNATE NAMES- IMP-K PRIME, IHE-D
10423, ISEE-B
DAUGHTER

NSSDC ID- 77-102B

LAUNCH DATE- 10/22/77

WEIGHT- 165.78 KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

INTERNATIONAL
UNITED STATES

ESA
NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3454.1 MIN
PERIAPSIS- 280. KM ALT

EPOCH DATE- 10/23/77
INCLINATION- 28.7 DEG
APOAPSIS- 138317. KM ALT

PERSONNEL

MG - R.E. HALPERN
SC - E.R. SCHMERLING
PM - A. HAWKARD
VS - V. FORMISANO

NASA HEADQUARTERS
NASA HEADQUARTERS
ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THE EXPLORER-CLASS DAUGHTER SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE 1, 2, AND 3). THE PURPOSES OF THE MISSION WERE (1) TO INVESTIGATE SOLAR-TERRRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTED OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE OF 23 EARTH RADII. THE SPACECRAFT MAINTAINED A SMALL SEPARATION DISTANCE, AND MADE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE. THE SPIN RATE OF THE SPACECRAFT WAS FIXED AT 19.8 RPM, DIFFERING SLIGHTLY FROM THAT OF THE ISEE 1 SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE ISEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 2, ANDERSON-----

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102B-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - K.A. ANDERSON
 OI - C.I. MENG
 OI - J.M. BOSQUED
 OI - R. PELLAT
 OI - F.V. CORONITI
 OI - M. RENE
 OI - R.P. LIN
 OI - G.K. PARKS

U OF CALIF, BERKELEY
 APPLIED PHYSICS LAB
 CESR
 CTR FOR THEORETIC PHYS
 U OF CALIF, LA
 CESR
 U OF CALIF, BERKELEY
 U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE, BY USING IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL EXTENT, PROPAGATION VELOCITY, AND TEMPORAL BEHAVIOR OF A WIDE VARIETY OF PARTICLE PHENOMENA. ELECTRONS WERE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS; 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS WERE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS; 8 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 380 KEV. THE 30-KEV THRESHOLD COULD BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTED OF A PAIR OF SURFACE-BARRIER, SEMICONDUCTOR-DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND FOUR FIXED-VOLTAGE ELECTROSTATIC ANALYZERS (TWO FOR ELECTRONS AND TWO FOR PROTONS). CHANNEL MULTIPLIERS WERE USED AS DETECTORS WITH THE FIXED-VOLTAGE ANALYZERS. THE TELESCOPES HAD A VIEWING CONE WITH HALF-ANGLE 40 DEGREES, ORIENTED AT ABOUT 20 DEGREES TO THE SPIN AXIS.

----- ISEE 2, EGIDI -----

INVESTIGATION NAME- SOLAR WIND IONS

NSSDC ID- 77-1028-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - A. EGIDI
 OI - G. MORENO
 OI - P. CERULLI
 OI - V. FORMISANO
 OI - S.C. CANTARANO

CNR, SPACE PLASMA LAB
 CNR, SPACE PLASMA LAB
 CNR, SPACE PLASMA LAB
 ESA-ESTEC
 CNR, SPACE PLASMA LAB

BRIEF DESCRIPTION

THIS INSTRUMENT WAS DESIGNED TO MEASURE THE ANGULAR DISTRIBUTIONS AND ENERGY SPECTRA OF POSITIVE IONS IN THE SOLAR WIND. THE MAIN REGION OF INTEREST WAS OUTWARD FROM AND INCLUDING THE MAGNETOPAUSE (GREATER THAN 8 EARTH RADII). TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS WERE USED TO COVER THE ENERGY RANGE 100 EV TO 10 KEV/Q IN UP TO 64 ENERGY CHANNELS. THERE WERE TWO OPERATING MODES: ONE FOR HIGH-TIME RESOLUTION AND ONE FOR HIGH-ENERGY RESOLUTION. ENERGY LEVELS WERE KEPT CONSTANT THROUGH A COMPLETE SPACECRAFT REVOLUTION.

----- ISEE 2, FRANK -----

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- 77-1028-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - L.A. FRANK
 OI - V.M. VASYLIUNAS
 OI - C.F. KENNEL

U OF IOWA
 MPI-AERONOMY
 U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL AND TEMPORAL VARIATIONS OF THE SOLAR WIND AND MAGNETOSHEATH ELECTRONS AND IONS. PROTONS AND ELECTRONS IN THE ENERGY RANGE FROM 1 EV TO 45 KEV WERE MEASURED IN 64 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION ($\Delta E/E$) OF 0.16. A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA), EMPLOYING SEVEN CONTINUOUS-CHANNEL ELECTRON MULTIPLIERS IN EACH OF ITS TWO (ONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS WAS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE 4-PI-SR SOLID ANGLE WAS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE WAS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR WAS SENSITIVE TO ELECTRONS WITH E GREATER THAN OR EQUAL TO 45 KEV, AND PROTONS WITH E GREATER THAN OR EQUAL TO 600 KEV.

----- ISEE 2, GURNETT -----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 77-1028-05

INVESTIGATIVE PROGRAM
CODE ST/CO-UPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT
 OI - F.L. SCARF
 OI - E.J. SMITH
 OI - R.W. FREDERICKS

U OF IOWA
 TRW SYSTEMS GROUP
 NASA-JPL
 TRW SYSTEMS GROUP

BRIEF DESCRIPTION

IN THIS EXPERIMENT, A SINGLE-AXIS SEARCH COIL MAGNETOMETER WITH A HIGH PERMEABILITY CORE AND TWO ELECTRIC FIELD DIPOLES (50 M AND 0.61 M) MEASURED WAVE PHENOMENA OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE MOTHER SPACECRAFT. THE ANTENNAS WERE MOUNTED PERPENDICULARLY TO THE SPIN AXIS. THE INSTRUMENTATION WAS COMPOSED OF TWO ELEMENTS: (1) A HIGH-TIME-RESOLUTION SPECTRUM ANALYZER WITH 16 FREQUENCY CHANNELS (IDENTICAL TO THOSE ON ISEE 1) FROM 5.62 HZ TO 31.1 KHZ. ALL CHANNELS WERE SAMPLED 1 OR 4 TIMES PER S, DEPENDING ON BIT RATE; AND (2) A WIDE-BAND RECEIVER TO CONDITION ELECTRIC AND MAGNETIC WAVEFORMS FOR TRANSMISSION TO THE GROUND VIA THE SPECIAL-PURPOSE ANALOG TRANSMITTER. THERE WERE TWO BASIC FREQUENCY CHANNELS, FROM 10 HZ TO 1 KHZ AND FROM 650 HZ TO 10 KHZ. IN ADDITION, THE FREQUENCY RANGE COULD BE SHIFTED BY A FREQUENCY-CONVERSION SCHEME TO ANY OF EIGHT RANGES UP TO 2.0 MHZ.

----- ISEE 2, HARVEY -----

INVESTIGATION NAME- RADIO PROPAGATION

NSSDC ID- 77-1028-06

INVESTIGATIVE PROGRAM
CODE ST/CO-UPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - C.C. HARVEY
 OI - R.E. GENDRIN
 OI - J.R. MCAFEE
 OI - M. PETIT
 OI - D. JONES
 OI - J.M. ETCHETO
 OI - R.J.L. GRARD

PARIS OBSERVATORY
 CNET
 NOAA-ERL
 CNET
 BRITISH ANTARCTIC SURV
 CNET
 ESA-ESTEC

BRIEF DESCRIPTION

THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER WAS OBTAINED BY MEASURING THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 683 KHZ, TRANSMITTED FROM THE MOTHER (EXPERIMENT 8) AND RECEIVED ON THE DAUGHTER. THE PHASE WAS COMPARED AGAINST A PHASE-COHERENT SIGNAL TRANSMITTED FROM THE MOTHER TO THE DAUGHTER BY MODULATION ONTO A CARRIER OF FREQUENCY HIGH ENOUGH (272.5 MHZ) TO BE UNAFFECTED BY THE AMBIENT PLASMA.

----- ISEE 2, RUSSELL -----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-1028-04

INVESTIGATIVE PROGRAM
CODE ST/CO-UPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL
 OI - R.L. MCPHERSON
 OI - P.C. HEDGECOCK
 OI - E.W. GREENSTADT
 OI - M.G. KIVELSON

U OF CALIF, LA
 U OF CALIF, LA
 IMPERIAL COLLEGE
 TRW SYSTEMS GROUP
 U OF CALIF, LA

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD WERE ENCLOSED IN A FLIPPEN MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT WAS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAD TWO OPERATING RANGES OF PLUS OR MINUS 8192 NT AND PLUS OR MINUS 256 NT IN EACH VECTOR COMPONENT. THE DATA WERE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE WERE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION, 16-BIT SAMPLES OF DATA WERE TRANSMITTED. THIS PROVIDED A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 NT OR 1/128 NT IN THE LOW- AND HIGH-SENSITIVITY RANGES.

----- ISEE 2, WILLIAMS -----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

ORIGINAL PAGE IS
 OF POOR QUALITY

NSSDC ID- 77-102W-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - T.A. FRITZ
OI - C.U. ROSTROM
OI - E. KEPLER
OI - R. WILKEN
OI - G.M. WIMBERENZ

NOAA-ERL
NOAA-ERL
APPLIED PHYSICS LAB
MPI-AERONOMY
MPI-AERONOMY
U OF KIEL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO IDENTIFY AND TO STUDY PLASMA INSTABILITIES RESPONSIBLE FOR ACCELERATION, SOURCE AND LOSS MECHANISMS, AND BOUNDARY AND INTERFACE PHENOMENA THROUGHOUT THE ORBITAL RANGE OF MOTHER/ DAUGHTER SATELLITES. A PROTON TELESCOPE AND AN ELECTRON SPECTROMETER WERE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRA AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USED SILICON, SURFACE-BARRIER, TOTALLY DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 2 MEV AND ELECTRONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 300 KEV (TO 1.2 MEV FOR 90 DEG) WERE MEASURED. DATA WERE ACCUMULATED IN UP TO 32 SECTORS PER SPIN.

***** ISEE 3*****

SPACECRAFT COMMON NAME- ISEE 3
ALTERNATE NAMES- STP PROBE, IME-M
HELIOCENTRIC, INTNL SUN EARTH EXPL-C
ISEE-C

NSSDC ID- 78-079A

LAUNCH DATE- 04/12/78 WEIGHT- 469. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-USS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 11/25/78
ORBIT PERIOD- 365. DAYS INCLINATION- 0. DEG
PERIAPSIS- 0.99 AU RAD APOAPSIS- 0.99 AU RAD

PERSONNEL

MG - H.H. CHISHOLM
SC - E.R. SCHMERLING
PM - J.P. CORMIGAN
PS - T.T. VON ROSENINGE
MO - R.O. WALES

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS HELIOCENTRIC SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE 1, 2, AND 3). THE PURPOSES OF THE MISSION WERE (1) TO INVESTIGATE SOLAR/TERRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR THE EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE LAUNCH OF THREE COORDINATED SPACECRAFT IN THIS MISSION PERMITTED THE SEPARATION OF SPATIAL AND TEMPORAL EFFECTS. THE HELIOCENTRIC SPACECRAFT HAD A SPIN AXIS NORMAL TO THE ECLIPTIC PLANE AND A SPIN RATE OF ABOUT 20 RPM. IT WAS PLACED INTO AN ELLIPTICAL HALD ORBIT ABOUT THE LIBRATION POINT (L1) 235 EARTH RADII ON THE SUN SIDE OF THE EARTH, WHERE IT CONTINUOUSLY MONITORED CHANGES IN THE NEAR-EARTH INTERPLANETARY MEDIUM. BECAUSE BOTH THE MOTHER AND DAUGHTER SPACECRAFT HAD ECCENTRIC GEOCENTRIC ORBITS, IT WAS HOPED THAT THIS MISSION WOULD MEASURE THE CAUSE/EFFECT RELATIONSHIPS BETWEEN THE INCIDENT SOLAR PLASMA AND THE MAGNETOSPHERE. FINALLY, THE HELIOCENTRIC SPACECRAFT ALSO PROVIDED A NEAR-EARTH BASE FOR MAKING COSMIC-RAY AND OTHER PLANETARY MEASUREMENTS FOR COMPARISON WITH COINCIDENT MEASUREMENTS FROM DEEP-SPACE PROBES. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE ISEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. 6E-16, NO. 3, JULY, 1978.

***** ISEE 3, ANDERSON*****

INVESTIGATION NAME- INTERPLANETARY AND SOLAR ELECTRONS

NSSDC ID- 78-079A-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - K.A. ANDERSON
OI - R.P. LIM
OI - D.F. SMITH
OI - S.W. KANE

U OF CALIF, BERKELEY
U OF CALIF, BERKELEY
HIGH ALTITUDE OBS
U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY SPECTRA AND ANISOTROPIES OF INTERPLANETARY AND SOLAR ELECTRONS (2 TO 1000 KEV) IN THE TRANSITION ENERGY RANGE BETWEEN SOLAR WIND AND LOW-ENERGY COSMIC RAYS. THE ELECTRONS WERE MEASURED BY A PAIR OF PASSIVELY COOLED, SURFACE-BARRIER, SEMICONDUCTOR-DETECTOR TELESCOPES (APPROXIMATELY 15 KEV TO APPROXIMATELY 1 MEV) AND BY A HEMISPHERICAL PLATE ELECTROSTATIC ANALYZER WITH CHANNEL-MULTIPLIER DETECTORS (2-18 KEV). COUNTING RATES WERE SECTORED INTO ANGULAR SECTORS ABOUT EITHER THE MAGNETIC FIELD OR THE SUN DIRECTION. THE TELESCOPE YIELDED 8 OR 16 SECTORS AND THE ANALYZER YIELDED 16 SECTORS.

***** ISEE 3, ANDERSON*****

INVESTIGATION NAME- X- AND GAMMA-RAY BURSTS

NSSDC ID- 78-079A-14

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - K.A. ANDERSON
OI - S.W. KANE
OI - W.D. EVANS
OI - R.W. KLEBSADEL

U OF CALIF, BERKELEY
U OF CALIF, BERKELEY
LOS ALAMOS NAT LAB
LOS ALAMOS NAT LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE CONTINUOUS COVERAGE OF SOLAR-FLARE X RAYS AND TRANSIENT COSMIC GAMMA-RAY BURSTS. DETECTORS WERE A KENON-FILLED PROPORTIONAL COUNTER (5-14 KEV IN 6 CHANNELS) AND A SODIUM IODIDE SCINTILLATOR (12-1250 KEV IN 12 CHANNELS). THERE WERE FOUR OPERATING MODES: NORMAL, FLARE-1, FLARE-2, AND GAMMA-BURST. IN NORMAL MODE, TIME RESOLUTION WAS 0.5 TO 4 S, DEPENDING ON THE CHANNEL. IN GAMMA-BURST MODE, BEST TIME RESOLUTION WAS IN STORED DATA, WITH 0.25 TO 125 MS RESOLUTION.

***** ISEE 3, BARE*****

INVESTIGATION NAME- SOLAR WIND PLASMA

NSSDC ID- 78-079A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - S.J. BARE
OI - J.R. ASBRIDGE
OI - E.W. HONES, JR.
OI - W.D. MONTGOMERY
OI - W.C. FELDMAN

LOS ALAMOS NAT LAB
LOS ALAMOS NAT LAB
LOS ALAMOS NAT LAB
LOS ALAMOS NAT LAB
LOS ALAMOS NAT LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MAKE AN INTEGRATED STUDY OF THE NATURE, ORIGIN, AND EVOLUTION OF STRUCTURE IN THE INTERPLANETARY MEDIUM. ALSO, THE THERMAL STATE OF THE INTERPLANETARY PLASMA WAS STUDIED, UNPERTURBED BY THE EARTH'S BOW SHOCK. ION VELOCITY DISTRIBUTIONS WERE MEASURED BY A 135-DEG SPHERICAL ELECTROSTATIC ANALYZER IN BOTH TWO AND THREE DIMENSIONS. STEP ENERGY RESOLUTION FOR EACH ENERGY WINDOW WAS 4.2 PERCENT. ELECTRON VELOCITY DISTRIBUTIONS WERE MEASURED BY A 90-DEG SPHERICAL ELECTROSTATIC ANALYZER, ALSO IN TWO AND THREE DIMENSIONS. THE ENERGY WINDOW PER STEP FOR ELECTRONS WAS 10 PERCENT. CHANNELTRON ELECTRON MULTIPLIERS WERE USED AS DETECTORS FOR EACH OF THE ANALYZERS. SOLAR WIND ELECTRONS WERE MEASURED IN 15 CONTIGUOUS CHANNELS FROM 8.5 TO 1140 EV. A SPECIAL PHOTOELECTRON RANGE OF 1.6 TO 220 EV COULD BE COMMANDED. VARIOUS MIXTURES OF DATA FOR 2-D AND 3-D DISTRIBUTION FUNCTIONS COULD BE SELECTED. IONS WERE MEASURED IN 32 CHANNELS FROM 237 EV PER CHARGE TO 10.7 KEV PER CHARGE. VARIOUS MODES WERE AVAILABLE FOR BASIC SWEEP, SEARCH, AND TRACKING OF THE PEAK OF THE DISTRIBUTION.

***** ISEE 3, HECKMAN*****

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAY

NSSDC ID- 78-079A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - H.M. HECKMAN
OI - D.E. GREINER

LAWRENCE BERKELEY LAB
U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE ISOTOPIC ABUNDANCE IN THE PRIMARY COSMIC RAYS FOR HYDROGEN THROUGH NICKEL. THE INSTRUMENT USED A 10-ELEMENT, SOLID-STATE, PARTICLE TELESCOPE CONSISTING OF LITHIUM-DRIFTED SILICON DETECTORS. ENERGY RANGES MEASURED RAN FROM APPROXIMATELY 20 TO APPROXIMATELY 500 MEV PER NUCLEON. DIRECTION OF INCIDENT NUCLEI WAS OBTAINED FROM A SIX-PLANE DRIFT CHAMBER WITH 2-DEG RESOLUTION.

----- ISEE 3, HOVESTADT-----

INVESTIGATION NAME- LOW-ENERGY COSMIC RAYS

NSSDC ID- 78-079A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - D.K. HOVESTADT
OI - J.J. O'GALLAGHER
OI - C.Y. FAN
OI - G. GLOECKLER
OI - M. SCHOLER
OI - L.A. FISK

MPI-EXTRATERR PHYS
U OF MARYLAND
U OF ARIZONA
U OF MARYLAND
MPI-EXTRATERR PHYS
U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, WAS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/NUCLEON TO 80 MEV/NUCLEON, AND ELECTRONS IN FOUR CONTIGUOUS BANDS FROM 75 TO 1300 KEV. AT THE LOWER ENERGIES, CHARGE STATES OF HEAVY IONS IN THE HIGH-SPEED (GREATER THAN 500 KM/S) SOLAR WIND WERE DETERMINED. IN THE RANGE 0.3 TO 20 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS WERE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE WAS POSSIBLE. THE INSTRUMENT CONSISTED OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) WAS AN ELECTROSTATIC ANALYZER WITH SOLID-STATE DETECTORS. ITS ENERGY RANGE WAS APPROXIMATELY 3 TO 560 KEV/CHARGE. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) WAS A $DE/DX = E$ THIN-WINDOW, FLOW-THROUGH PROPORTIONAL COUNTER/SOLID-STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZER (ULTRALOW-ENERGY Z, E, AND Q) WAS A COMBINATION OF AN ELECTROSTATIC ANALYZER AND A $DE/DX = E$ SYSTEM WITH A THIN-WINDOW PROPORTIONAL COUNTER AND A POSITION-SENSITIVE SOLID-STATE DETECTOR. THE ENERGY RANGE WAS 0.4 TO 6 MEV/NUCLEON. DATA COULD BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 3, MYNDS-----

INVESTIGATION NAME- ENERGETIC PROTONS

NSSDC ID- 78-079A-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - R.J. MYNDS
OI - J.J. VAN ROOIJEN
OI - J.N. VAN GILS
OI - R.M. VAN DEN NIEUWENHOF
OI - K.P. WENZEL
OI - T.R. SANDERSON
OI - V. DOMINGO
OI - D.E. PAGE
OI - A. BALOGH
OI - C. DE JAGER
OI - M. ELLIOT

IMPERIAL COLLEGE
U OF UTRECHT
U OF UTRECHT
U OF UTRECHT
ESA-ESTEC
ESA-ESTEC
ESA-ESTEC
ESA-ESTEC
IMPERIAL COLLEGE
U OF UTRECHT
IMPERIAL COLLEGE

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY LOW-ENERGY SOLAR PROTON ACCELERATION AND PROPAGATION PROCESSES IN INTERPLANETARY SPACE. THE INSTRUMENT MEASURED THE ENERGY SPECTRUM IN 8 CHANNELS, AND THE 3-DIMENSIONAL ANGULAR DISTRIBUTION OF PROTONS IN THE ENERGY RANGE 0.035 TO 1.6 MEV WITH A BASIC TIME RESOLUTION OF 16 S. COUNTS OF EACH CHANNEL WERE GROUPED INTO EIGHT 45-DEG SECTORS. THE INSTRUMENT CONSISTED OF THREE IDENTICAL TELESCOPES MOUNTED AT 30, 60, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS, EACH CONTAINING TWO SURFACE-BARRIER DETECTORS, A MECHANICAL COLLIMATOR, AND A 'BROOM' MAGNET TO SWEEP AWAY ELECTRONS.

----- ISEE 3, MEYER-----

INVESTIGATION NAME- COSMIC-RAY ELECTRONS AND NUCLEI

NSSDC ID- 78-079A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - P. MEYER
OI - P. EVENSON

U OF CHICAGO
U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY PARTICLE PROPAGATION WITHIN THE SOLAR SYSTEM AND THE PROPERTIES OF THE INTERPLANETARY MEDIUM. THE FOLLOWING SPECIES WERE RESOLVED: (1) ELECTRONS (DIFFERENTIAL SPECTRUM FROM 5 TO 400 MEV); (2) NUCLEI FROM PROTONS TO THE IRON GROUP (DIFFERENTIAL SPECTRA AND RELATIVE ABUNDANCES FROM 30 TO 15,000 MEV/NUCLEON); AND (3) HELIUM THROUGH SULFUR. A CHARGED-PARTICLE TELESCOPE WAS USED TO MAKE THESE MEASUREMENTS. IT CONSISTED OF THREE SOLID-STATE DETECTORS, A GAS CERENKOV COUNTER, A CESIUM IODIDE SCINTILLATION DETECTOR, TWO PLASTIC SCINTILLATION COUNTERS, AND A QUARTZ CERENKOV COUNTER. THE DESIGN OF THE TELESCOPE WAS BASED ON THAT USED IN EXPERIMENT 68-014A-09 FOR OGO 5.

----- ISEE 3, OGILVIE-----

INVESTIGATION NAME- SOLAR WIND ION COMPOSITION

NSSDC ID- 78-079A-11

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - K.W. OGILVIE
OI - J. GEISS
OI - M.W. ACUNA
OI - M.A. COPLAN
OI - D.L. LIND

NASA-GSFC
U OF BERNE
NASA-GSFC
U OF MARYLAND
NASA-JSC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A HEMISPHERICAL ELECTROSTATIC ENERGY ANALYZER AND A WIEN VELOCITY FILTER CONFIGURED AS A MASS SPECTROMETER TO DETERMINE THE CHARGE STATE AND ISOTOPIC CONSTITUTION OF THE SOLAR WIND. THE INSTRUMENT HAD AN ENERGY-PER-UNIT-CHARGE RANGE OF 0.84 TO 11.7 KEV PER CHARGE, A MASS-PER-UNIT-CHARGE RANGE OF 1.5 TO 5.6 U PER CHARGE, AND A VELOCITY RANGE OF 300 TO 600 KM/S.

----- ISEE 3, SCARF-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 78-079A-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF
OI - D.A. GURNETT
OI - E.J. SMITH
OI - R.W. FREDERICKS

TRW SYSTEMS GROUP
U OF IOWA
NASA-JPL
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE DATA FOR PLASMA-WAVE STUDIES UNDERTAKEN TO GAIN A BETTER UNDERSTANDING OF THE WAVE-PARTICLE INTERACTION AND PLASMA INSTABILITIES, WHICH LEAD TO THE EQUIVALENT COLLISION PHENOMENA THAT PRODUCE APPARENT FLUID-LIKE BEHAVIOR IN THE SOLAR WIND NEAR 1 AU. TWO ELECTRIC DIPOLES AND A MAGNETIC SEARCH COIL, BOOM-MOUNTED, WERE USED TO MEASURE MAGNETIC AND ELECTRIC FIELD WAVE LEVELS FROM 17 HZ TO 1 KHZ IN EIGHT CHANNELS AND ELECTRIC FIELD LEVELS FROM 17 HZ TO 100 KHZ IN 16 CHANNELS. IN ADDITION, A THIRD SPECTRUM ANALYZER WITH 3 BANDS BETWEEN 0.316 AND 8.8 HZ WAS INCLUDED FOR MEASUREMENT OF THE MAGNETIC FIELD. THIS UNIT USED THE SEARCH COIL, BUT WAS LOCATED WITHIN THE ELECTRONICS UNIT OF EXPERIMENT 78-079A-02.

----- ISEE 3, SMITH-----

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- 78-079A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY MAGNETIC FIELDS
PARTICLES AND FIELDS

PERSONNEL

PI - E.J. SMITH
OI - L. DAVIS, JR.
OI - G.L. SISCOE
OI - D.E. JONES
OI - D.T. TSURUTANI

NASA-JPL
CALIF INST OF TECH
U OF CALIF, LA
WIGHAM YOUNG U
NASA-JPL

BRIEF DESCRIPTION

THE INSTRUMENTATION FOR THIS EXPERIMENT CONSISTED OF A BOOM-MOUNTED, TRIAXIAL VECTOR HELIUM MAGNETOMETER. MEASUREMENTS WERE MADE OF THE STEADY MAGNETIC FIELD AND ITS LOW-FREQUENCY VARIATIONS. EIGHT FIELD AMPLITUDE RANGES (MINUS TO PLUS 4, 14, 42, 144, 440, 1400, 22,000, AND 140,000 NT) WERE AVAILABLE. THE INSTRUMENT RANGED UP AND DOWN AUTOMATICALLY OR COULD BE COMMANDED INTO A SPECIFIC RANGE. THE FIELD EQUIVALENT NOISE POWER SPECTRAL DENSITY WAS 2.5×10^{-4} MT SQUARED PER HERTZ (INDEPENDENT OF FREQUENCY), OR 0.01 RMS IN THE PASSBAND 0 TO 0.5 HZ. A SINGLE-AXIS SPECTRUM ANALYZER MEASURED FLUCTUATIONS PARALLEL TO THE SPACECRAFT SPIN AXIS IN THREE FREQUENCY BANDS CENTERED AT 0.33, 3.2, AND 8.8 HZ.

----- ISEE 3, STEINBERG -----

INVESTIGATION NAME- RADIO MAPPING

NSSDC ID- 78-079A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
RADIO PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - J.L. STEINBERG
OI - P. COUTURIER
OI - R. KNOLL
OI - J. FAIBERG
OI - R.G. STONE
OI - S.R. MOSIER

PARIS OBSERVATORY
PARIS OBSERVATORY
PARIS OBSERVATORY
NASA-GSFC
NASA-GSFC
NATL SCIENCE FOUND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIRECTION (TWO ANGLES) OF TYPE III SOLAR BURSTS AT 24 FREQUENCIES STEPPED FROM 30 KHZ TO 2 MHZ. RELYING ON SOLAR ROTATION, ONE COULD OBTAIN THE 3-D MAP OF THE MAGNETIC LINES OF FORCE, WHICH GUIDE THE ELECTRONS THAT PRODUCE TYPE III SOLAR BURSTS FROM 10 SOLAR RADII TO 1 AU IN OR OUT OF THE ECLIPTIC. THE INSTRUMENT CONSISTED PRIMARILY OF TWO DIPOLE ANTENNAS AND A FOUR-CHANNEL RADIOMETER, WITH BANDWIDTHS OF 3 KHZ AND 10 KHZ. THE FREQUENCY SEQUENCE WAS 72 STEPS, TAKING 108 S. SELF-CALIBRATION OCCURRED EVERY 18 H.

----- ISEE 3, STONE -----

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAYS

NSSDC ID- 78-079A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - E.C. STONE
OI - R.E. VOGT

CALIF INST OF TECH
CALIF INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE ISOTOPIC CONSTITUTION OF SOLAR MATTER AND GALACTIC COSMIC-RAY SOURCES, THE PROCESSES OF NUCLEOSYNTHESIS IN THE SUN AND IN THE GALAXY, AND ASTROPHYSICAL PARTICLE ACCELERATION PROCESSES. THE FOLLOWING SPECIES WERE RESOLVED: LITHIUM THROUGH NICKEL (Z FROM 3 THROUGH 28 AND A FROM 6 THROUGH 64) IN THE ENERGY RANGE FROM 5 TO 250 MEV/NUCLEON. THE MASS RESOLUTION WAS LESS THAN OR APPROXIMATELY EQUAL TO 0.3 U FOR Z LESS THAN OR EQUAL TO 30.

----- ISEE 3, TEEGARDEN -----

INVESTIGATION NAME- GAMMA-RAY BURSTS

NSSDC ID- 78-079A-15

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - H.J. TEEGARDEN
OI - D.K. MOVESTADT
OI - T.L. CLINE
OI - G. GLOECKLER

NASA-GSFC
MPI-EXTRATERR PHYS
NASA-GSFC
U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS, AND TO PROVIDE HIGH-RESOLUTION SPECTRA OF GAMMA-RAY BURST PHOTONS BETWEEN 0.05 AND 6.5 MEV. THE DETECTORS WERE (1) A 4 CM DIAM BY 3 CM THICK GERMANIUM CRYSTAL, RADIATIVELY COOLED TO OPERATE AT APPROXIMATELY 101 DEGREES K. ENERGY RESOLUTION WAS LESS THAN 3.5 KEV AT 1 MEV. A 4096-CHANNEL ADC DIGITIZED THE SIGNALS FOR INPUT TO THE GAMMA-BURST DIGITAL INSTRUMENTATION, WHICH WAS IN THE LOW-ENERGY COSMIC-RAY EXPERIMENT, 78-079A-03; (2) THE CESIUM IODIDE AND SURROUNDING DETECTORS IN THE COSMIC-RAY ELECTRONS AND NUCLEI EXPERIMENT, 78-079A-06. BOTH TEMPORAL AND SPECTRAL INFORMATION WERE OBTAINED FROM THIS DETECTOR; AND (3) A SMALLER CESIUM IODIDE CRYSTAL IN EXPERIMENT 78-079A-05. TWO TIME-HISTORY MEMORIES OF 2000 12-BIT WORDS WERE USED, FED FROM ANY OF THE 3 DETECTORS BY COMMAND. THE STORED VALUES WERE TIME

INTERVALS OVER WHICH A FIXED NUMBER (1-128) OF COUNTS WAS ACCUMULATED. THE TIME-INTERVAL CLOCK FREQUENCY WAS SELECTABLE FROM 1 TO 8 KHZ. SPECTRAL INFORMATION FROM EITHER OF DETECTORS (1) AND (2) WAS STORED IN A THIRD MEMORY OF 3072 16-BIT WORDS. TWELVE BITS WERE USED FOR PULSE-HEIGHT DATA AND FOUR BITS FOR TIME. THE COUNTING RATES INPUT TO THE TIME HISTORY MEMORIES CAUSED A TRIGGER TO OCCUR IF RATES EXCEEDED A COMMANDABLE VALUE. WHEN THIS OCCURRED, ALL THREE MEMORIES WERE ALLOWED TO FILL. THEY COULD BE DUMPED AT A VERY LOW BIT RATE, EITHER AUTOMATICALLY OR BY COMMAND.

----- ISEE 3, VON ROSENVIINGE -----

INVESTIGATION NAME- MEDIUM ENERGY COSMIC RAY

NSSDC ID- 78-079A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - T.V. VON ROSENVIINGE
OI - L.A. FISK
OI - F.B. McDONALD
OI - J.M. TRAINOR
OI - M.A. VAN HOLLEBEKE

NASA-GSFC
U OF NEW HAMPSHIRE
NASA-GSFC
NASA-GSFC
U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE COMPOSITION OF SOLAR COSMIC RAYS FROM HYDROGEN THROUGH IRON AND THE ELEMENTAL ABUNDANCE OF GALACTIC COSMIC RAYS. THREE COSMIC-RAY TELESCOPES, PLUS A PROPORTIONAL COUNTER FOR MEASUREMENT OF ELECTRONS AND X RAYS, COMPRISED THE INSTRUMENTATION. NUCLEI WITH Z BETWEEN 1 AND 30 WERE MEASURED IN VARIOUS ENERGY WINDOWS IN THE RANGE 1 TO 500 MEV/NUCLEON. UNIT MASS RESOLUTION WAS OBTAINED FOR ISOTOPES WITH Z EQUAL TO 1, 2, AND 3 TO 7 IN THE ENERGY RANGES 4 TO 70, 1 TO 70, AND 30 TO 140 MEV/NUCLEON, RESPECTIVELY. ELECTRONS WERE MEASURED IN THE ENERGY RANGE APPROXIMATELY 2 TO 10 MEV. ANISOTROPY INFORMATION WAS OBTAINED FOR THE ELECTRONS AND NUCLEI WITH Z EQUAL TO 1 TO 26.

----- ISEE 3, WILCOX -----

INVESTIGATION NAME- GROUND BASED SOLAR STUDIES

NSSDC ID- 78-079A-13

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - J.M. WILCOX

STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THE MEASUREMENT OF LARGE-SCALE SOLAR MAGNETIC AND VELOCITY FIELDS WITH THE STANFORD GROUND-BASED SOLAR TELESCOPE, AND THE COMPARISON OF THESE MEASUREMENTS WITH MEASUREMENTS OF THE INTERPLANETARY MAGNETIC FIELD AND SOLAR WIND MADE BY OTHER EXPERIMENTS ON THIS SPACECRAFT. THE PURPOSE OF THE EXPERIMENT WAS TO STUDY THE LARGE-SCALE STRUCTURE OF THE SOLAR MAGNETIC FIELD AND ITS EXTENSION INTO INTERPLANETARY SPACE BY THE SOLAR WIND.

***** ISEE 1 *****

SPACECRAFT COMMON NAME- ISIS 1
ALTERNATE NAMES- ISIS-A, 03669

NSSDC ID- 69-009A

LAUNCH DATE- 01/30/69

WEIGHT- 241. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

CANADA
UNITED STATESCRC
NASA-OSF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 128.42 MIN
PERIAPSIS- 578. KM ALT

EPOCH DATE- 02/04/69
INCLINATION- 88.42 DEG
APOAPSIS- 3926. KM ALT

PERSONNEL

RG - H.B. WEINRED
RG - C.A. FRANKLIN
SC - E.R. SCHMERLING
SC - T.R. HARTZ
PM - L.M. BRACE
PS - L.M. BRACE

NASA HEADQUARTERS
COMMON RESEARCH CENTRE
NASA HEADQUARTERS
COMMON RESEARCH CENTRE
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

ISIS 1 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH SWEEP- AND FIXED-FREQUENCY IONOSPHERES, A VLF RECEIVER, ENERGETIC AND SOFT PARTICLE DETECTORS, AN ICM MASS SPECTROMETER, AN ELECTROSTATIC PROBE, AN ELECTROSTATIC ANALYZER, A BEACON TRANSMITTER, AND A COSMIC NOISE EXPERIMENT. THE SOUNDER USED TWO DIPOLE ANTENNAS (75 AND 10.7 M LONG, RESPECTIVELY). THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.9

RPM AFTER ANTENNA DEPLOYMENT. SOME CONTROL COULD BE EXERCISED OVER THE SPIN RATE AND ATTITUDE BY USING MAGNETICALLY INDUCED TORQUES TO CHANGE THE SPIN RATE AND TO PRECESS THE SPIN AXIS. A TAPE RECORDER WITH 1-M CAPACITY WAS INCLUDED ON THE SATELLITE. THE SATELLITE COULD BE PROGRAMMED TO TAKE RECORDED OBSERVATIONS FOR FOUR DIFFERENT TIME PERIODS FOR EACH FULL RECORDING PERIOD. THE RECORDER DATA WERE DUMPED ONLY AT OTTAWA. FOR NON-TAPE-RECORDED OBSERVATIONS, DATA FOR THE SATELLITE AND SUBSATELLITE REGIONS COULD BE ACQUIRED AND TELEMETERED WHEN THE SPACECRAFT WAS IN THE LINE OF SIGHT OF TELEMETRY STATIONS. THE SELECTED TELEMETRY STATIONS WERE IN AREAS THAT PROVIDED PRIMARY DATA COVERAGE NEAR THE 80 DEG W MERIDIAN AND IN AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA. NASA SUPPORT OF THE ISIS PROJECT WAS TERMINATED ON 1 OCTOBER 1979. A SIGNIFICANT AMOUNT OF EXPERIMENTAL DATA, HOWEVER, WERE ACQUIRED AFTER THIS DATE BY THE CANADIAN PROJECT TEAM.

----- ISIS 1, HARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 69-009A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - R.E. BARRINGTON COMMUN RESEARCH CENTRE
OI - F.W. PALMER COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY NATURAL AND MANMADE VLF SIGNALS. SPECIFIC OBJECTIVES INCLUDED THE INVESTIGATION OF VLF PROPAGATION PHENOMENA, ION AND HYBRID PLASMA RESONANCES, AND CORRELATIONS BETWEEN VLF EMISSIONS AND INTENSE FLUXES OF ENERGETIC PARTICLES. IN THIS EXPERIMENT AN ATTEMPT WAS MADE TO STIMULATE THE ION RESONANCES OF THE AMBIENT PLASMA BY USING SIGNALS FROM A VLF SWEEP-FREQUENCY EXCITER, CONTAINED WITHIN THE SPACECRAFT. THE INSTRUMENTATION CONSISTED OF A LOW-FREQUENCY, BROADBAND RECEIVER THAT SENSED SIGNALS RECEIVED BY THE 73-M DIPOLE (SPLIT MONOPOLE) ANTENNA, BETWEEN 0.05 AND 30 KHZ. THIS SAME ANTENNA WAS USED FOR RECEIVING FREQUENCIES BELOW 5 MHZ ON THE IONOSONDE. THE RECEIVER HAD A WIDE DYNAMIC RANGE (80 DB) THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL SYSTEM. THIS VLF EXPERIMENT INCLUDED AN OPTIONAL-USE ONBOARD EXCITER THAT OPERATED OVER A FREQUENCY CYCLE FROM 0 TO 0.3 TO 0 TO 11 TO 0 KHZ OVER A 3.5-S 'FRAME' PERIOD. THE FRAMES SEQUENCED THROUGH FOUR STEPS WHERE THE TRANSMISSIONS WERE ATTENUATED BY 0, 20, 20, THEN 40 DB, THUS REQUIRING 14 S FOR ONE COMPLETE CYCLE OF EXCITER OPERATION. THE EXCITER TRANSMITTED ON THE SHORT ANTENNAS AND THE RECEIVER SENSED THE SIGNALS COUPLED BETWEEN THE TWO ANTENNAS BY THE AMBIENT PLASMA, PLUS ANY NOISE SIGNALS WHICH WERE EXCITED IN THE PLASMA. THIS VLF EXPERIMENT ALSO PERMITTED ANTENNA IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.08-MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE-RECORDER CHANNELS DURING THE TIME THE TAPE RECORDER OPERATED. TAPE-RECORDED AND BACKUP, REAL-TIME DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 1, ORATE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 69-009A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - L.M. BRACE NASA-USFC
OI - J.A. FINDLAY NASA-USFC

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY THE GLOBAL VARIATIONS OF ELECTRON TEMPERATURE AND ELECTRON CONCENTRATION AT SPACECRAFT (SC) ALTITUDES DURING SOLAR MAXIMUM, AND TO STUDY CHARACTERISTICS OF THE SC ION SHEATH. THE MEASUREMENTS WERE MADE WITH TWO CYLINDRICAL PROBES, OPERATING AS LANGMUIR PROBES. FROM THE PROBE CURRENT-VERSUS-VOLTAGE DATA, THE ELECTRON DENSITY AND ELECTRON TEMPERATURE COULD BE CALCULATED. THERE WAS A BOOM PROBE AND AN AXIAL PROBE. THE AXIAL PROBE EXTENDED 46.3 CM FROM THE SC, ALONG THE SPIN AXIS, AND WAS CENTERED AMONG THE FOUR TELEMETRY ANTENNAS ON THE UNDERSIDE OF THE SC. THIS PROBE WAS CAPABLE OF MEASUREMENTS UNDISTURBED BY THE SATELLITE MOTION ONLY WHEN THE PROBE PRECEDED THE SC IN ITS MOTION THROUGH THE PLASMA. THE BOOM PROBE EXTENDED HORIZONTALLY AND OUTWARD (IN SC FRAME OF REFERENCE) FROM A BOOM 1 M LONG, WHICH IN TURN EXTENDED FROM AN UPPER SURFACE OF THE SATELLITE AT AN ANGLE OF ABOUT 45 DEG TO THE SPIN AXIS. THIS PROBE PROVIDED SOME OBSERVATIONS DURING EACH SC SPIN CYCLE THAT WAS FREE OF SC WAKE EFFECTS. THE PROBES CONSISTED OF THREE CONCENTRIC, ELECTRICALLY ISOLATED, STAINLESS STEEL TUBES. THE OUTER (0.24-CM DIAM AND 23-CM LONG) TUBE FLOATED AT ITS OWN EQUILIBRIUM POTENTIAL AND SERVED TO PLACE THE COLLECTOR WELL AWAY FROM THE SC PLASMA SHEATH. THE CENTER TUBE (0.165-CM DIAM) EXTENDING 23 CM OUTWARD FROM THE OUTER TUBE ACTED AS AN ELECTRICAL GUARD FOR THE COLLECTOR. ITS ELECTRICAL POTENTIAL WAS CONTROLLED. THE

COLLECTOR (0.050-CM DIAM) EXTENDED 23 CM OUTWARD FROM THE DRIVEN GUARD. DURING EACH 2-MIN SEQUENCE, A VOLT-AMPERE CURVE WAS OBTAINED FROM THE SAWTOOTH VOLTAGE (-2 TO +10V) APPLIED TO THE COLLECTOR. THIS CAN BE INTERPRETED IN ELECTRON DENSITIES OVER A RANGE FROM 1.62 TO 1.566 ELECTRONS PER CUBIC CM, AND TEMPERATURES FROM ABOUT 400 TO 90,000 DEG K. NSSDC HAS ALL THE USEFUL DATA THAT EXIST FROM THIS INVESTIGATION.

----- ISIS 1, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 69-009A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - W. CALVERT U OF IOWA
OI - R.B. NORTON NOAA-ERL
OI - J.M. WARMOCK NOAA
OI - J.W. WHITTEKER COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER, AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE REFLECTED PULSE) AND TIME. THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF A TELEMETRY STATION. THE FIXED-FREQUENCY SOUNDER OPERATED FROM THE SAME ANTENNA, TRANSMITTER, AND RECEIVER USED FOR THE SWEEP-FREQUENCY EXPERIMENT. IT NORMALLY OPERATED FOR 5 S DURING THE FREQUENCY FLICKER PERIOD OF THE SWEEP-FREQUENCY OPERATION THAT WAS EVERY 19 OR 29 S. ONE OF SIX FREQUENCIES (0.25, 0.48, 1.00, 1.95, 4.00, OR 9.303 MHZ) WAS CHOSEN FOR USE BY THE EXPERIMENTER AS DESIRED. OTHER MODES OF OPERATION WERE AVAILABLE, INCLUDING CONTINUOUS OBSERVATION AT A SELECTED FREQUENCY, AND A SPECIAL MIXED MODE WITH TRANSMISSION AT THE FIXED FREQUENCY OF 0.82 MHZ AND SWEEP RECEPTION.

----- ISIS 1, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 69-009A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - T.R. HARTZ COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE SWEEP-FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO NOISE LEVELS. THE RECEIVER SWEEPED FROM 0.1 TO 20 MHZ. THE DYNAMIC RANGE WAS 90 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 16.7-M AND 73-M DIPOLES.

----- ISIS 1, MCDIARMID-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 69-009A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - I.B. MCDIARMID NATL RES COUNC OF CAN
OI - J.R. BURROWS NATL RES COUNC OF CAN
OI - R.C. ROSE(RETIRE) NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE DATA THAT WILL AID IN UNDERSTANDING (1) THE MECHANISMS RESPONSIBLE FOR THE PRODUCTION AND CONTROL OF THE OUTER RADIATION ZONE, (2) THE RELATED PROBLEMS OF PARTICLE ENTRY INTO THE EARTH'S MAGNETIC FIELD, AND (3) INTERACTIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND THE SOLAR WIND. THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST SET, COMPRISING FOUR GEIGER COUNTERS, MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV AND PROTONS GREATER THAN 300 AND 500 KEV PARALLEL AND PERPENDICULAR TO THE SATELLITE SPIN AXIS. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE SECOND SET CONSISTED OF SOLID-STATE SILICON JUNCTION DETECTORS. THESE RESPONDED TO ELECTRONS GREATER THAN 25 AND 140 KEV, ELECTRONS IN THE RANGE 200 TO 770 KEV, AND PROTONS GREATER THAN 200 AND 400 KEV. THE THIRD SET CONSISTED OF FIVE SILICON JUNCTION DETECTORS THAT RESPONDED TO PROTONS BETWEEN 0.15 AND 30 KEV. THE FOURTH SET CONSISTED OF CESIUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS. EACH SYSTEM OPERATED IN TWO MODES AND RESPONDED TO ELECTRONS GREATER THAN 0, 40, AND 60 KEV AND PROTONS GREATER THAN 50 KEV AND IN THE RANGE 50 TO 70 KEV.

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OF POOR QUALITY

----- ISIS 1, SAGALYN-----

INVESTIGATION NAME- SPHERICAL ELECTROSTATIC ANALYZER

NSSDC ID- 69-009A-00

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.C. SAGALYN
OI - M. SHIDDY

USAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THE SPHERICAL ELECTROSTATIC ANALYZER EXPERIMENT WAS TO MEASURE THE TEMPORAL AND SPATIAL VARIATIONS IN THE CONCENTRATION AND ENERGY DISTRIBUTION OF THE CHARGED PARTICLES THROUGHOUT THE ORBIT. SPECIFICALLY, THE OBJECTIVES WERE TO MEASURE THE FOLLOWING PARAMETERS: (1) THE DENSITY OF POSITIVE IONS HAVING THERMAL ENERGY IN THE CONCENTRATION RANGE FROM 1.E1 TO 1.E6 IONS PER CUBIC CM, (2) THE KINETIC TEMPERATURE OF THE THERMAL IONS IN THE RANGE FROM 700 TO 4000 DEG K, (3) THE FLUX AND ENERGY SPECTRUM OF PROTONS IN THE RANGE FROM 0 TO 2 KEV, AND (4) THE SATELLITE POTENTIAL WITH RESPECT TO THE UNDISTURBED PLASMA. TWO UNITS MADE UP THE EXPERIMENT PACKAGE: A 96-CM HOON THAT SUPPORTED THE SENSOR AND MADE POSSIBLE OMNIDIRECTIONAL MEASUREMENTS, AND AN ELECTRONICS PACKAGE (CONSIDERED TO INCLUDE THE SENSOR) TO PERFORM THE MEASUREMENTS AND TO PROCESS THE DATA INTO A SUITABLE FORM FOR TELEMETRY. THE SENSOR WAS MADE UP OF THREE CONCENTRIC SPHERICAL MESHED GRIDS HAVING RADII OF 3.18, 2.54, AND 1.90 CM. THE INNERMOST GRID WAS THE COLLECTOR. THESE GRIDS WERE MADE FROM TUNGSTEN MESH AND HAD A TRANSPARENCY OF 80 TO 90 PERCENT. TO MEASURE THE PARAMETERS LISTED ABOVE, SUITABLE SWEEP AND STEP VOLTAGES WERE APPLIED TO THE GRIDS. THIS INSTRUMENT WAS OPERATED IN SEVERAL MODES. THE ION DENSITIES WERE SAMPLED 60 TIMES A SECOND, CORRESPONDING TO A SPATIAL RESOLUTION OF 150 M. ONCE PER MIN THE RATIO OF MASS TO TEMPERATURE WAS SAMPLED, AND THE ENERGY DISTRIBUTION WAS SAMPLED ONCE EVERY 2 MIN.

----- ISIS 1, WHITTEKER-----

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSSDC ID- 69-009A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.H. WHITTEKER
OI - J.E. JACKSON
OI - J. TURNER
OI - M. SYLVAIN
OI - O. MOLT
OI - Y. OGATA
OI - R. RAGHAVARAO
OI - R.H. NORTON
OI - C.E. PETRIE
OI - K.L. CHAN
OI - R.S. UNWIN

COMMUN RESEARCH CENTRE
NASA-GSFC
IONOSPHERIC PRED SERV
LGE
AURORAL OBS
RADIO RESEARCH LAB
PHYSICAL RESEARCH LAB
NOAA-ERL
COMMUN RESEARCH CENTRE
NASA-ARC
DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO INVESTIGATE THE IONOSPHERIC ELECTRON DENSITY IN THE ALTITUDE RANGE 300 TO 3500 KM FOR A FULL SOLAR CYCLE (BY COMBINING THE ISIS 1 MEASUREMENTS WITH THE ALOUETTE 2 DATA). ANOTHER IMPORTANT FUNCTION OF THE SOUNDER WAS TO PROVIDE CORRELATIVE DATA FOR THE OTHER ISIS 1 EXPERIMENTS, PARTICULARLY THOSE MEASURING IONOSPHERIC PARAMETERS. THE ISIS 1 IONOSONDE WAS A RADIO TRANSMITTER/RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND A RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED ONCE EVERY 19 OR 29 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO SOUNDED FOR A PERIOD OF 3 TO 5 S DURING THIS 19- OR 29-S PERIOD. IN ADDITION TO THE SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS POSSIBLE WHERE THE TRANSMITTER FREQUENCY WAS FIXED AT 0.82 MHZ WHILE THE RECEIVER SWEEPED. SEVERAL VIRTUAL HEIGHT (DELAY TIME) TRACES WERE NORMALLY OBSERVED DUE TO GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL HEIGHT AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORMAT WAS AN IONOGRAM SHOWING VIRTUAL HEIGHT AS A FUNCTION OF FREQUENCY.

***** ISIS 2*****

SPACECRAFT COMMUN NAME- ISIS 2
ALTERNATE NAMES- ISIS-B, PL-701F
05104

NSSDC ID- 71-024A

LAUNCH DATE- 04/01/71

WEIGHT- 206. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

CANADA
UNITED STATES

CRC
NASA-055

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 113.6 MIN
PERIAPSIS- 1352. KM ALT

EPOCH DATE- 04/02/71
INCLINATION- 88.1 DEG
APOAPSIS- 1428. KM ALT

PERSONNEL

MG - M.B. WEINREB
SC - E.R. SCHMERLING
SC - T.R. MARTZ
PM - C.A. FRANKLIN
PM - L.H. BRACE
PS - L.H. BRACE

NASA HEADQUARTERS
NASA HEADQUARTERS
COMMUN RESEARCH CENTRE
COMMUN RESEARCH CENTRE
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

ISIS 2 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH A SWEEP AND A FIXED-FREQUENCY IONOSONDE, A VLF RECEIVER, ENERGETIC AND SOFT PARTICLE DETECTORS, AN ION MASS SPECTROMETER, AN ELECTROSTATIC PROBE, A RETARDING POTENTIAL ANALYZER, A BEACON TRANSMITTER, A COSMIC NOISE EXPERIMENT, AND TWO PHOTOMETERS. TWO LONG CROSSED-DIPOLE ANTENNAS (73 AND 16.7 M LONG) WERE USED FOR THE SOUNDING, VLF, AND COSMIC NOISE EXPERIMENTS. THE SPACECRAFT WAS SPIN-STABILIZED TO ABOUT 2 RPM AFTER ANTENNA DEPLOYMENT. THERE WERE TWO BASIC ORIENTATION MODES FOR THE SPACECRAFT, CANTHHEEL AND ORBIT-ALIGNED. THE SPACECRAFT OPERATED APPROXIMATELY THE SAME LENGTH OF TIME IN EACH MODE, REMAINING IN ONE MODE TYPICALLY 3 TO 5 MO. THE CANTHHEEL MODE WITH THE AXIS PERPENDICULAR TO THE ORBIT PLANE WAS MADE AVAILABLE TO PROVIDE RAM AND WAKE DATA FOR SOME EXPERIMENTS FOR EACH SPIN PERIOD, RATHER THAN EACH ORBIT PERIOD. ATTITUDE AND SPIN INFORMATION WAS OBTAINED FROM A THREE-AXIS MAGNETOMETER AND A SUN SENSOR. CONTROL OF ATTITUDE AND SPIN WAS POSSIBLE BY MEANS OF MAGNETIC TORQUING. THE EXPERIMENT PACKAGE ALSO INCLUDED A PROGRAMMABLE TAPE RECORDER WITH A 1-M CAPACITY. FOR NONRECORDED OBSERVATIONS, DATA FROM SATELLITE AND SUBSATELLITE LOCATIONS WERE TELEMETRED WHEN THE SPACECRAFT WAS IN THE LINE OF SIGHT OF A TELEMETRY STATION. TELEMETRY STATIONS WERE LOCATED SO THAT PRIMARY DATA COVERAGE WAS NEAR THE 80-DEG-W MERIDIAN AND NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, FRANCE, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA. NASA SUPPORT OF THE ISIS PROJECT WAS TERMINATED ON 1 OCTOBER 1979. A SIGNIFICANT AMOUNT OF EXPERIMENTAL DATA, HOWEVER, WERE ACQUIRED AFTER THIS DATE BY THE CANADIAN PROJECT TEAM.

----- ISIS 2, ANGER-----

INVESTIGATION NAME- 3914- AND 5577-A PHOTOMETER

NSSDC ID- 71-024A-11

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.D. ANGER

U OF CALGARY

BRIEF DESCRIPTION

THIS DUAL-WAVELENGTH SCANNING AURORAL PHOTOMETER WAS DESIGNED TO MAP THE DISTRIBUTION OF AURORAL EMISSIONS AT 5577 AND 3914 A OVER THE PORTION OF THE DARK EARTH VISIBLE TO THE SPACECRAFT. A COMBINATION OF INTERNAL ELECTRONIC SCANNING PERFORMED BY AN IMAGE DISSECTOR AND OF THE NATURAL ORBITAL AND ROTATIONAL MOTIONS OF THE SPACECRAFT PERMITTED THE SENSOR TO SYSTEMATICALLY SCAN ACROSS THE EARTH. THE DETECTOR SYSTEM WAS CONSTRUCTED TO ALLOW INCIDENT RADIATION TO BE ACCEPTED FROM TWO DIRECTIONS 180 DEG APART, AND THEN TO FOCUS THIS LIGHT AT A COMMON POINT ON THE SINGLE-IMAGE-DISSECTOR PHOTOMETER TUBE. ONLY ONE OF THE TWO OPTICAL SYSTEMS POINTED AT THE EARTH AT ANY ONE TIME, WHILE THE OTHER FACED INTO SPACE. WHEN THE SPACECRAFT SPIN AXIS WAS ORIENTED TO LIE IN THE ORBITAL PLANE, EACH ROTATION OF THE SPACECRAFT RESULTED IN AN EARTH SCAN 5 DEG WIDE. THIS WIDTH SIZE WAS CHOSEN TO INSURE OVERLAP WITH THE PREVIOUS SCAN. THE IMAGE DISSECTOR REPETITIVELY SCANNED AT A HIGH SPEED ACROSS THE NARROW DIMENSION OF EACH 5-DEG BAND AND DIVIDED IT INTO SEPARATELY RESOLVED REGIONS 0.4 DEG BY 0.4 DEG. SIMILAR STRIPS WERE SCANNED AT EACH OF THE TWO WAVELENGTHS, BUT AT TIMES THAT DIFFERED BY HALF THE ROTATION PERIOD OF ABOUT 10 S. A CALIBRATION LIGHT SOURCE FOR EACH WAVELENGTH WAS BUILT INTO THE OPTICAL ASSEMBLY, AND A CALIBRATE CYCLE WAS INITIATED AUTOMATICALLY WHENEVER A 'POWER ON' COMMAND WAS GIVEN. TO MINIMIZE THE PROBLEMS ARISING FROM SOLAR ILLUMINATION OF THE OPTICS AND THE DIRECT VIEWING OF THE SUNLIT EARTH, A SUNLIGHT PROTECTION SYSTEM WAS INCLUDED. COMPLETE DETAILS ABOUT THE EXPERIMENT CAN BE FOUND IN THE REPORT 'THE ISIS-2 SCANNING AURORAL PHOTOMETER,' C. D. ANGER, T. FANCOTT, J. MCNALLY, AND M. S. KERR, APPLIED OPTICS, 12, 8, 1753-1766, AUGUST 1973.

----- ISIS 2, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 71-024A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - R.E. BARRINGTON
OI - F.M. PALMER

COMMUN RESEARCH CENTRE
COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY NATURAL AND MANMADE VLF SIGNALS. SPECIFIC OBJECTIVES INCLUDED THE INVESTIGATION OF VLF PROPAGATION PHENOMENA, ION AND HYBRID PLASMA RESONANCES, AND CORRELATIONS BETWEEN VLF EMISSIONS AND INTENSE FLUXES OF ENERGETIC PARTICLES. IN THIS EXPERIMENT A SWEEP-FREQUENCY EXCITER, COVERING THE RANGE 15 TO 0.05 KHZ IN 1.0 S, WAS USED TO STIMULATE ION RESONANCES IN THE PLASMA. THE INSTRUMENTATION CONSISTED OF A LOW-FREQUENCY BROADBAND RECEIVER THAT OBSERVED SIGNALS FROM THE 73-M LONG DIPOLE (SPLIT MONOPOLE) ANTENNA BETWEEN 0.05 AND 30 KHZ. THIS SAME ANTENNA WAS USED FOR RECEIVING SIGNALS BELOW 5 MHZ ON THE IONOSPHERE. THE VLF RECEIVER HAD A WIDE DYNAMIC RANGE THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL SYSTEM. THE EXPERIMENT ALSO PERMITTED ANTENNA IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.00-MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE-RECORDER CHANNELS WHEN THE SPACECRAFT TAPE-RECORDER WAS OPERATING. TAPE-RECORDED AND BACKUP REAL-TIME DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 2, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 71-024A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - W. CALVERT
OI - R.B. NORTON
OI - J.M. WHITTAKER
OI - J.M. WARMOCK

U OF IOWA
NOAA-ERL
COMMUN RESEARCH CENTRE
NOAA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE PULSE) AND TIME. THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF A TELEMETRY STATION. THE FIXED-FREQUENCY SOUNDER OPERATED FROM THE SAME ANTENNA, TRANSMITTER, AND RECEIVER USED FOR THE SWEEP-FREQUENCY EXPERIMENT. IT NORMALLY OPERATED FOR 3 TO 5 S DURING THE FREQUENCY FLICKER PERIOD OF THE SWEEP-FREQUENCY OPERATION WHICH WAS EVERY 14 OR 21 S. ONE OF SIX FREQUENCIES (0.12, 0.40, 1.00, 1.05, 4.00, OR 0.303 MHZ) WAS CHOSEN FOR USE BY THE EXPERIMENTER, AS DESIRED. OTHER MODES OF OPERATION WERE AVAILABLE, INCLUDING CONTINUOUS OBSERVATION AT A SELECTED FREQUENCY AND A SPECIAL MIXED MODE WITH TRANSMISSION AT A SELECTED ONE OF THE SIX FIXED FREQUENCIES AND SWEEP RECEPTION.

----- ISIS 2, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 71-024A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - T.R. HARTZ

COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE SWEEP-FREQUENCY IONOSPHERE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO-NOISE LEVELS. THE RECEIVER SWEEP FROM 0.1 TO 20 MHZ. THE DYNAMIC RANGE WAS 50 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 18.7-M AND 73-M DIPOLES.

----- ISIS 2, MAIER-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 71-024A-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - E.J. MAIER
OI - D.E. TROY, JR.
OI - J.L. DONLIV

NASA-GSFC
US NAVAL RESEARCH LAB
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MEASURE THE POSITIVE ION DENSITY, COMPOSITION, AND TEMPERATURE IN THE VICINITY OF THE SPACECRAFT. A SECONDARY OBJECTIVE WAS TO MEASURE THE THERMAL ELECTRON DENSITY AND TEMPERATURE, AND THE FLUX OF SUPRATHERMAL ELECTRONS. THIS RETARDING POTENTIAL ANALYZER CONSISTED OF THREE GRIDS (APERTURE GRID, RETARDING GRID, AND SUPPRESSOR GRID) THAT PROVIDED A VOLT-AMPERE CURVE RELATING SWEEP VOLTAGE ON THE RETARDING GRID TO CURRENT FLOW TO THE COLLECTOR. ANALYSIS OF THE VOLT-AMPERE CURVES PROVIDED ION/ELECTRON TEMPERATURES AND DENSITIES. THIS EXPERIMENT WAS DESIGNED TO OPERATE ONLY WITH THE SATELLITE IN A CARTWHEEL MODE OF OPERATION. IN THIS MODE, THE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE. THIS ALLOWED THE ANALYZER APERTURE TO FACE THE DIRECTION OF SATELLITE MOTION ONCE EACH SPIN PERIOD.

----- ISIS 2, MCDIARMID-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 71-024A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - I.B. MCDIARMID
OI - J.R. BURROWS

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BRIEF DESCRIPTION

THE OBJECTIVES OF THE ENERGETIC PARTICLE EXPERIMENT WERE TO PROVIDE DATA THAT WOULD AID IN THE UNDERSTANDING OF (1) THE MECHANISMS RESPONSIBLE FOR THE PRODUCTION AND CONTROL OF THE OUTER RADIATION ZONE; (2) THE RELATED PROBLEM OF SOLAR-FLARE PARTICLE ENTRY INTO THE EARTH'S MAGNETIC FIELD; AND (3) INTERACTIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND THE SOLAR WIND. THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST SET CONSISTED OF THREE GEIGER COUNTERS (OF WHICH ONE FAILED AFTER LAUNCH) AND MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV PERPENDICULAR AND PARALLEL TO THE SPIN AXIS. THESE GEIGER COUNTERS WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 240 AND 600 KEV, RESPECTIVELY. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE SECOND SET CONSISTED OF TWO SOLID-STATE SILICON JUNCTION DETECTORS. BOTH DETECTORS WERE OPERATED IN LOW- AND HIGH-THRESHOLD MODE, WHILE ONE COULD ADDITIONALLY BE SWITCHED TO ANOTHER DISCRIMINATION LEVEL. THEY MEASURED ELECTRONS WITH ENERGIES GREATER THAN 40, 60, 90, 120, 150, AND 200 KEV. THEY WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 150, 200, AND 750 KEV. THE SWITCHABLE DETECTOR EXPERIENCED CONTINUOUS SATURATION. THE THIRD SET CONSISTED OF THREE SILICON-JUNCTION DETECTORS THAT MEASURED PROTONS IN THE ENERGY RANGES 0.8 TO 4.0, 3.2 TO 12.7, AND 12.9 TO 28.0 MEV. ALPHA PARTICLES IN THE ENERGY RANGE 2.5 TO 16.0 MEV, AND ELECTRONS IN THE ENERGY RANGE 1.0 TO 7.0 MEV. THE FOURTH SET WAS COMPOSED OF TWO CESIUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS (CHANNELTRONS WITH CYLINDRICAL ELECTROSTATIC ANALYZERS) STEPPED THROUGH EIGHT ENERGIES IN 64/60 OF A SECOND. THESE DIFFERENTIAL SPECTROMETERS MEASURED ELECTRONS AT 9.6, 7.0, 6.0, 4.1, 3.0, 2.2, 1.3, AND 0.15 KEV, AND MEASURED PROTONS AT 26.2, 21.6, 17.0, 12.4, 9.4, 7.0, 5.2, AND 2.2 KEV.

----- ISIS 2, SHEPHERD-----

INVESTIGATION NAME- 6300-A PHOTOMETER

NSSDC ID- 71-024A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.G. SHEPHERD

YORK U

BRIEF DESCRIPTION

A TWO-CHANNEL PHOTOMETER WAS USED TO MEASURE DIRECTLY AND TO MAP THE INTENSITY OF THE ATOMIC OXYGEN RED LINE AT 6300 A IN DAY, TWILIGHT, AND NIGHT AIRGLOW AND AURORA. EACH CHANNEL HAD ITS OWN OPTICAL INPUT, AND THE TWO INPUTS WERE MOUNTED AT THE SAME END OF THE SPACECRAFT, SEPARATED BY 180 DEG, WITH THEIR AXES AT 90 DEG TO THE SPACECRAFT'S SPIN AXIS. ONE OPTICAL INPUT WAS CHARACTERIZED BY A SPECTRAL BANDWIDTH OF 12 A CENTERED AROUND THE 6300-A LINE OF ATOMIC OXYGEN, AND THE OTHER INPUT WAS USED FOR WHITE-LIGHT MEASUREMENTS. THE SPINNING SATELLITE CAUSED THE PHOTOMETER TO ALTERNATELY VIEW THE EARTH AND THEN THE SKY, I.E., WHEN ONE SENSOR VIEWED THE EARTH, THE OTHER SENSOR SAW THE SKY. BOTH SENSORS HAD A 2.5-DEG CIRCULAR FIELD OF VIEW, WITH THE USE OF A PEAR-COMBINER ARRANGEMENT. THE SAME PHOTOMULTIPLIER ACCEPTED THE TWO INPUTS. THE DYNAMIC RANGE OF INTENSITY MEASUREMENTS WAS FROM ABOUT 1.011 PHOTONS PER 50 M PER S (10 RAYLEIGHS) TO MORE THAN 1.016 PHOTONS PER 50 M PER S. SUNLIGHT COULD ENTER THE OPTICAL SYSTEMS DIRECTLY IN ADDITION TO EARTH-REFLECTED LIGHT. THE INSTRUMENT DAPPLE WAS ILLUMINATED BY THE SUN ONLY FOR THE OFF-AXIS ANGLES LESS THAN 47 DEG.

OUTSIDE THIS LIMIT, THE DATA WERE NOT DEGRADED BY SUNLIGHT, PERMITTING NORMAL OPERATION IN THE REGION OF THE ORBIT WHERE THE SPACECRAFT WAS IN SUNLIGHT, BUT THE PORTION OF THE EARTH BENEATH IT WAS DARK. AN EXTERNAL LIGHT SOURCE 'SAW' THE FILTER ONLY WHEN IT WAS 7.5 DEG OR LESS OFF AXIS. IN THE RANGE 7.5 TO 47 DEG, GOOD DATA WERE STILL OBTAINED WHEN THE SUNLIT EARTH WAS THE ORIGIN OF THE CONTAMINATION. TO PERFORM THE DATA ANALYSIS, IT WAS NECESSARY, AMONG OTHER OPERATIONS, TO EVALUATE DIFFERENT GEOMETRICAL SITUATIONS, AND TO LOCATE THE ON-EARTH LAMB CROSSING OF THE 12-A BANDPASS PHOTOMETER SO THAT THE DATA COULD BE ORGANIZED INTO SPIN MAPS. FOR MORE DETAILS SEE 'ISIS-2 ATOMIC OXYGEN RED LINE PHOTOMETER,' G.G. SHEPHERD, ET AL, 'APPLIED OPTICS,' 12, 8, 1767-1774, AUGUST 1973.

----- ISIS 2, WHITTAKER-----

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSDC ID- 71-024A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.M. WHITTAKER	COMMUN RESEARCH CENTRE
O1 - J. TURNER	IONOSPHERIC PRED SERV
O1 - M. SYLVAIN	LGE
O1 - O. MOLT	AURORAL OBS
O1 - Y. OGATA	RADIO RESEARCH LAB
O1 - R. RAGHAVARAO	PHYSICAL RESEARCH LAB
O1 - J.E. JACKSON	NASA-GSFC
O1 - C.B. PETRIE	COMMUN RESEARCH CENTRE
O1 - R.B. NORTON	NRAA-ERL
O1 - R.L. CHAN	NASA-ARC
O1 - R.S. UNWIN	DEPT OF SCI-INDUST RES

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO MEASURE THE IONOSPHERIC ELECTRON DENSITY IN THE ALTITUDE RANGE 300 TO 1400 KM. ANOTHER IMPORTANT FUNCTION OF THE SOUNDER WAS TO PROVIDE CORRELATIVE DATA FOR THE OTHER ISIS 2 EXPERIMENTS, PARTICULARLY THOSE MEASURING IONOSPHERIC PARAMETERS. THE ISIS 2 IONOSONDE WAS A RADIO TRANSMITTER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND RETURNED RADIO-FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED EVERY 14 OR 21 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO USED FOR SOUNDING FOR A FEW SECONDS DURING EACH 14- OR 21-S PERIOD. IN ADDITION TO THE SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS AVAILABLE IN WHICH THE TRANSMITTER FREQUENCY WAS FIXED AT ONE OF SIX POSSIBLE FREQUENCIES WHILE THE RECEIVER SWEEPED SEVERAL VIRTUAL-RANGE (DELAY-TIME) TRACES RESULTING FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC., WERE NORMALLY OBSERVED. VIRTUAL RANGE AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORMAT WAS AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO FREQUENCY.

***** ISIS-2 *****

SPACECRAFT COMMON NAME- ISIS-2
ALTERNATE NAMES- IONOSP SOUNDING SAT 2, 10674
UME 2, ISIS-2

NSDC ID- 70-019A

LAUNCH DATE- 02/16/78 WEIGHT- 135. KG
LAUNCH SITE- TANEGASHIMA, JAPAN
LAUNCH VEHICLE- NU

SPONSORING COUNTRY/AGENCY
JAPAN RRL

INITIAL ORBIT PARAMETERS	EPOCH DATE- 02/17/78
ORBIT TYPE- GEOCENTRIC	INCLINATION- 69.4 DEG
ORBIT PERIOD- 107. MIN	APOPSIS- 1225. KM ALT
PERIAPSIS- 972. KM ALT	

PERSONNEL	
PI - Y. HAKURA	RADIO RESEARCH LAB
PS - N. MATSUURA	RADIO RESEARCH LAB

BRIEF DESCRIPTION

THE IONOSPHERE SOUNDING SATELLITE (ISS) WAS PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). ITS OBJECTIVES WERE TO ACCUMULATE DATA FOR STUDY OF THE TOPSIDE IONOSPHERE AND TO SURVEY RADIO NOISE AT FOUR FREQUENCIES, FROM BOTH EARTH AND COSMIC SOURCES. IT PREPARED WORLD-WIDE MAPS OF 12 CRITICAL FREQUENCY FROM THE IONOSPHERE SOUNDING DATA. THE ISS 2 WAS A SMALL OBSERVATORY WITH FOUR EXPERIMENTS ON BOARD. THE SPACECRAFT, A RIGID CYLINDER, 82 CM LONG AND 15.4 CM IN DIAMETER, WAS SPIN STABILIZED AT ABOUT 13 RPM WITH THE SPIN AXIS NORMAL TO THE ECLIPTIC PLANE. TWO PAIRS OF CROSSED DIPOLE ANTENNAS EXTENDED FROM THE CENTRAL PART OF THE SATELLITE AND LAY PERPENDICULAR TO THE SPIN AXIS. THESE ANTENNAS, 36.8 AND 11.4 M LONG, WERE UNFURLED IN ORBIT AND WERE SHARED BY IONOSPHERIC SOUNDING AND RADIO NOISE EXPERIMENTS. A SPHERICAL RETARDING POTENTIAL TRAP SENSOR WAS MOUNTED ON A BOOM PERPENDICULAR TO THE SPIN AXIS. A MAGNETIC ATTITUDE SENSOR WAS MOUNTED ON A SIMILAR BOOM ON THE OPPOSITE SIDE OF THE SPACECRAFT. THE REMAINING EXPERIMENT INVOLVED A BENNETT-TYPE

MASS SPECTROMETER WITH TWO SENSORS FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT. SPACECRAFT ATTITUDE WAS DETERMINED BY MEANS OF A MAGNETOMETER, A SOLAR SENSOR, AND AN EARTH HORIZON SENSOR. SMALL TELEMETRY AND COMMAND ANTENNAS EXTENDED FROM THE SPACECRAFT. THE SPACECRAFT WAS POWERED FROM A BATTERY SOLAR-CELL SYSTEM WITH SOLAR CELLS COVERING MOST OF THE CYLINDRICAL SURFACE. ONE RECORDER ON BOARD PERMITTED SPACECRAFT OPERATION IN EITHER A RECORDED (FOR UP TO 112 MIN) OR REAL-TIME MODE. READOUT AND REAL-TIME OPERATION WAS DONE FROM KASHIMA, JAPAN, AND OTTAWA STATION, CANADA.

----- ISS-0, AIRYO-----

INVESTIGATION NAME- SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)

NSDC ID- 70-019A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - K. AIRYO	RADIO RESEARCH LAB
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BRIEF DESCRIPTION

THE IONOSPHERE SOUNDING SATELLITE (ISS) IONOSONDE WAS A PULSED RADIO TRANSMITTER AND RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED PULSE AND ITS RETURN. FREQUENCIES BETWEEN 0.5 AND 14.0 MHZ WERE SAMPLED IN 0.1-MHZ STEPS TO PROVIDE VIRTUAL RANGE (DELAY TIME) OF SIGNAL REFLECTIONS. MORE THAN ONE VIRTUAL RANGE-VS-FREQUENCY TRACE WAS OFTEN OBSERVED. THESE RESULTED FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL RANGE AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORM, AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO PULSE FREQUENCY, WAS USED TO DISPLAY THESE OBSERVATIONS. TWO OTHER FORMS OF DATA WERE PREPARED FROM THESE IONOGRAMS. THEY WERE DIGITAL (FREQUENCY OF VIRTUAL RANGE) VALUES OF CHARACTERISTIC IONOSPHERIC FEATURES READ DIRECTLY FROM THE IONOGRAM, AND COMPUTED PROFILES OF ELECTRON DENSITY. THIS SOUNDING MODE OF OPERATION, CALLED TOP-B, REQUIRED 16 S TO SAMPLE ALL FREQUENCIES (ONE IONOGRAM). A TOP-A MODE WAS ALSO AVAILABLE. IN THE TOP-A MODE, AN ITERATIVE LOGIC WAS EMPLOYED WITH THE PULSED TRANSMISSION TO DETERMINE THE F2 REGION CRITICAL FREQUENCY, ITS CORRESPONDING VIRTUAL HEIGHT, AND OTHER RELATED SUPPORTING DATA. UNFORTUNATELY, THE TOP-A MODE FAILED TO FUNCTION DUE TO INTERNAL SPURIOUS NOISE. WITH DATA FROM THE TOP-B MODE, WORLD-WIDE MAPS OF CRITICAL FREQUENCY WERE PREPARED. FOR BOTH THE TOP-A AND TOP-B MODES, THE COMPLETE CYCLE TIME BETWEEN SUCCESSIVE IONOGRAMS OR SUCCESSIVE CRITICAL FREQUENCY OBSERVATIONS WAS 64 S.

----- ISS-0, IWAMOTO-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSDC ID- 70-019A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - I. IWAMOTO	RADIO RESEARCH LAB
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BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE THE POSITIVE ION COMPOSITION OVER THE SPACECRAFT ORBIT. TWO BENNETT-TYPE ION MASS SPECTROMETERS WERE FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT TO LOOK IN OPPOSITE DIRECTIONS ALONG THE SPIN AXIS. THE INSIDE DIAMETER OF THESE CYLINDRICAL SENSORS WAS 36 MM. THE MASS RANGE COVERED WAS 1 TO 20 U, AND THE ION CONCENTRATIONS WERE MEASURED OVER THE RANGE FROM 1 TO 1.64 IONS PER CUBIC CM.

----- ISS-0, KOTAKI-----

INVESTIGATION NAME- RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ

NSDC ID- 70-019A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M. KOTAKI	RADIO RESEARCH LAB
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BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE TO OBSERVE AND STUDY (1) THE GLOBAL DISTRIBUTION OF SPHERICAL AND (2) THE TIME VARIATION OF SPHERICAL AND COSMIC NOISE. RADIO NOISE IN THE FREQUENCY CHANNELS -- 2.497, 4.997, 9.997, 18.003, 20.006, AND 25.006 MHZ -- WAS OBSERVED. CHARACTERISTICS OBSERVED AT EACH FREQUENCY WERE NOISE INTENSITY (RESOLUTION OF 1/12.8 S) AND OCCURRENCE FREQUENCY OF IMPULSIVE NOISE (1.6, 12 DB ABOVE RESOLVED INTENSITY).

----- ISS-B, MIYAZAKI-----

INVESTIGATION NAME- REGARDING POTENTIAL TRAP

NSDDC ID- 78-012A-03

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - S. MIYAZAKI

RADIO RESEARCH LAB

BRIEF DESCRIPTION

THIS PROBE WAS A SPHERICAL RETARDING POTENTIAL TRAP DESIGNED TO OBSERVE AMBIENT ION AND ELECTRON DENSITIES RANGING FROM 10.13 TO 10.16 PER CUBIC CM. AMBIENT ION AND ELECTRON TEMPERATURES IN THE RANGE 500 TO 5000 DEG K WERE DETERMINED. AS WITH ALL RETARDING POTENTIAL INSTRUMENTS, THESE PARAMETERS WERE DERIVED FROM INTERPRETATION OF THE CURRENT FLOW MEASUREMENT WITH A GIVEN VOLTAGE SEQUENCE APPLIED TO THE COLLECTOR AND SCREEN GRIDS. THE SENSOR WAS MOUNTED ON A BOOM EXTENDING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. IT CONSISTED OF A 2-CM DIAMETER COLLECTOR, CONCENTRICALLY ENVELOPED BY 6- AND 10-CM DIAMETER SPHERICAL WIRE GRIDS. THE CURRENT VOLTAGE ANALOG DATA WERE TELEMETERED AND SUBSEQUENTLY ANALYZED BY THE EXPERIMENTER.

----- IUE-----

SPACECRAFT COMMON NAME- IUE

ALTERNATE NAMES- INT ULTRAVIOLET EXPL, SAS-B
10637

NSDDC ID- 78-012A

LAUNCH DATE- 01/26/78

WEIGHT- 669. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

INTERNATIONAL

ESA

UNITED KINGDOM

SRC

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

EPOCH DATE- 01/27/78

ORBIT PERIOD- 1425.7 MIN

INCLINATION- 28.4 DEG

PERIAPSIS- 29669. KM ALT

APOGAPSIS- 45887. KM ALT

PERSONNEL

MG - M.B. CHISHOLM

NASA HEADQUARTERS

SC - E.J. WEILER

NASA HEADQUARTERS

PM - J.P. CORRIGAN

NASA-GSFC

PS - A. MUGLESS, SRD

NASA-GSFC

BRIEF DESCRIPTION

THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE, FORMERLY SAS-B) SATELLITE WAS A SPACEBORNE ULTRAVIOLET ASTRONOMICAL OBSERVATORY FOR USE AS AN INTERNATIONAL FACILITY. THE IUE CONTAINED A 45-CM TELESCOPE SOLELY FOR SPECTROSCOPY IN THE WAVELENGTH RANGE OF 115 TO 325 NM. THE SATELLITE AND OPTICAL INSTRUMENTATION WERE PROVIDED BY THE GODDARD SPACE FLIGHT CENTER (GSFC). THE TELEVISION CAMERAS USED AS DETECTORS WERE PROVIDED BY THE UNITED KINGDOM SCIENCE RESEARCH COUNCIL (UKSRC). THE EUROPEAN SPACE AGENCY (ESA, FORMERLY ESRO) SUPPLIED SOLAR PADDLES FOR THE SATELLITE AND A EUROPEAN CONTROL CENTER. AFTER LAUNCH, TWO-THIRDS OF THE OBSERVING TIME WAS DIRECTED FROM A CONTROL CENTER AT GSFC; ONE-THIRD OF THE TIME, THE SATELLITE WAS OPERATED FROM THE EUROPEAN CONTROL CENTER NEAR MADRID. THE IUE OBSERVATORY WAS IN A SYNCHRONOUS ORBIT. THE 45-CM RITCHEY-CHRETIEN F/15 TELESCOPE HAD A SPECTROGRAPH PACKAGE. THE SPECTROGRAPH PACKAGE, USING SEC VIDICON CAMERAS AS DETECTORS, COVERED THE SPECTRAL RANGE FROM 115 TO 325 NM. IT OPERATED IN EITHER A HIGH- OR LOW-RESOLUTION MODE, WITH RESOLUTIONS OF APPROXIMATELY .01 AND .6 NM, RESPECTIVELY. THE SEC VIDICONS COULD INTEGRATE THE SIGNAL FOR UP TO MANY HOURS. THIS INTEGRATION TIME LIMITED DETECTION IN THE HIGH- AND LOW-RESOLUTION MODES TO APPROXIMATELY 50 AND 0.3 PHOTONS/(CM² CM² S NM), RESPECTIVELY, FOR A SIGNAL-TO-NOISE RATIO OF 50. LISTINGS OF GUEST OBSERVERS AND THEIR INVESTIGATIONS CAN BE OBTAINED FROM THE IUE NEWSLETTER, IUE OBSERVATORY, CODE 685, GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND, 20771 U.S.A.

----- IUE, GUEST INVESTIGATORS-----

INVESTIGATION NAME- LOW/HIGH-RESOLUTION, ULTRAVIOLET
SPECTROGRAPH PACKAGE

NSDDC ID- 78-012A-01

INVESTIGATIVE PROGRAM
CODE SC/CO-UP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI -

GUEST INVESTIGATORS

SEE EXPR. DESCRIPT.

BRIEF DESCRIPTION

THIS EXPERIMENT INCLUDED THE ULTRAVIOLET SPECTROGRAPH PACKAGE CARRIED BY THE IUE, CONSISTING OF TWO PHYSICALLY DISTINCT ECHELLE-SPECTROGRAPH/CAMERA UNITS CAPABLE OF ASTRONOMICAL OBSERVATIONS. EACH SPECTROGRAPH WAS A THREE-ELEMENT ECHELLE SYSTEM, COMPOSED OF AN OFF-AXIS PARABOLOIDAL COLLIMATOR, AN ECHELLE GRATING, AND A SPHERICAL FIRST-ORDER GRATING THAT WAS USED TO SEPARATE THE ECHELLE ORDERS AND FOCUS THE SPECTRAL DISPLAY ON AN IMAGE CONVERTER-PLUS-SEC VIDICON CAMERA. FOR EACH UNIT THERE WAS A SPARE CAMERA. THE CAMERA UNITS WERE ABLE TO INTEGRATE THE SIGNAL. THE READOUT/PREPARATION CYCLE FOR THE CAMERAS TOOK APPROXIMATELY 20 MIN. WAVELENGTH CALIBRATION WAS PROVIDED BY THE USE OF A HOLLOW CATHODE COMPARISON LAMP. THE PHOTOMETRIC CALIBRATION WAS ACCOMPLISHED BY OBSERVING STANDARD STARS WHOSE SPECTRAL FLUXES HAD BEEN PREVIOUSLY CALIBRATED BY OTHER MEANS. BOTH ECHELLE-SPECTROGRAPH/CAMERA UNITS WERE CAPABLE OF HIGH-RESOLUTION (0.1 A) OR LOW-RESOLUTION (6 A) PERFORMANCE. THE DUAL HIGH/LOW-RESOLUTION CAPABILITY WAS IMPLEMENTED BY THE INSERTION OF A FLAT MIRROR IN FRONT OF THE ECHELLE GRATING, SO THAT THE ONLY DISPERSION WAS PROVIDED BY THE SPHERICAL GRATING. AS THE SEC VIDICONS COULD INTEGRATE THE SIGNAL FOR UP TO MANY HOURS, DATA WITH A SIGNAL-TO-NOISE RATIO OF 50 COULD BE OBTAINED FOR 60 STARS OF 9TH AND 14TH MAGNITUDE IN THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. THE DISTINGUISHING CHARACTERISTIC OF THE UNITS WAS THEIR WAVELENGTH COVERAGE. ONE UNIT COVERED THE WAVELENGTH RANGE FROM 119.2 TO 192.4 NM IN THE HIGH-RESOLUTION MODE, AND 113.5 TO 288.5 NM IN THE LOW-RESOLUTION MODE. FOR THE OTHER UNIT, THE RANGE WAS FROM 119.5 TO 305.1 NM AND 119 TO 325.5 NM FOR THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. EACH UNIT ALSO HAD ITS OWN CHOICE OF ENTRANCE APERTURES: EITHER A 3-ARC S HOLE OR A 10-BY 20-ARC S SLOT. THE 10-BY 20-ARC S SLOTS COULD BE BLOCKED BY A COMMON SHUTTER, BUT THE 3-ARC S APERTURE WAS ALWAYS OPEN. AS A RESULT, TWO APERTURE CONFIGURATIONS WERE POSSIBLE: (1) BOTH 3-ARC S APERTURES OPEN AND BOTH 10-BY 20-ARC S SLOTS CLOSED, OR (2) ALL FOUR APERTURES OPEN. WITH THIS INSTRUMENTATION, THE OBSERVATIONAL OPTIONS OPEN TO AN OBSERVER WERE LONG-WAVELENGTH AND/OR SHORT-WAVELENGTH SPECTROGRAPH, HIGH- OR LOW-RESOLUTION, AND LARGE OR SMALL APERTURES. EXPOSURES COULD BE MADE WITH THE TWO SPECTROGRAPHS SIMULTANEOUSLY, BUT REMEMBERING THAT THE ENTRANCE APERTURES FOR EACH WERE DISTINCT AND SEPARATED IN THE SKY BY ABOUT 1 ARC MIN. AN ADDITIONAL RESTRICTION WAS THAT DATA COULD BE READ OUT FROM ONLY ONE CAMERA AT A TIME. HOWEVER, ONE CAMERA COULD BE EXPOSING WHILE THE OTHER CAMERA WAS BEING READ OUT. THE CHOICE OF HIGH OR LOW RESOLUTION COULD BE MADE INDEPENDENTLY FOR THE TWO SPECTROGRAPHS SO THAT THE OPERATIONAL MODES OF THE UNITS NEED NOT HAVE BEEN THE SAME. LISTINGS OF GUEST OBSERVERS AND THEIR INVESTIGATIONS CAN BE OBTAINED FROM THE IUE NEWSLETTER, IUE OBSERVATORY, CODE 685, GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND, 20771 U.S.A.

----- IUE, NONE ASSIGNED-----

INVESTIGATION NAME- PARTICLE FLUX MONITOR (SPACECRAFT)

NSDDC ID- 78-012A-02

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI -

NONE ASSIGNED

BRIEF DESCRIPTION

THE PARTICLE FLUX MONITOR EXPERIMENT WAS PLACED IN IUE TO MONITOR THE TRAPPED ELECTRON FLUXES THAT AFFECTED THE SENSITIVITY OF THE ULTRAVIOLET SENSOR IN THE IUE SPECTROGRAPH PACKAGE EXPERIMENT. NSDDC ID- 78-012A-01. THE PARTICLE FLUX MONITOR WAS A LITHIUM-DRIFTED SILICON DETECTOR WITH A HALF-ANGLE CONICAL FIELD OF VIEW OF 16 DEG. IT HAD AN ALUMINUM ABSORBER OF 0.147 G/CM² IN FRONT OF THE COLLIMATOR AND A BRASS SHIELDING HAVING A MINIMUM THICKNESS OF 2.31 G/CM². THE EFFECTIVE ENERGY THRESHOLD FOR ELECTRON MEASUREMENTS WAS 1.5 MEV. THE EXPERIMENT WAS ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 15 MEV. DATA CAN BE PROVIDED TO INTERESTED PERSONS IN THE FORM OF DAILY STRIP CHARTS BY THE IUEOCC. THE INSTRUMENT WAS USED AS AN OPERATIONAL TOOL TO AID IN DETERMINING BACKGROUND RADIATION AND ACCEPTABLE CAMERA EXPOSURE TIME. IT WAS PROVIDED BY DR. C. MUSTROM OF THE APPLIED PHYSICS LABORATORY.

----- JIKIEN-----

SPACECRAFT COMMON NAME- JIKIEN

ALTERNATE NAMES- EPOSPHERIC SAT, M, EXOS-M
11027

NSDDC ID- 78-087A

LAUNCH DATE 09/16/78

WEIGHT- 92. KG

LAUNCH SITE- KAGOSHIMA, JAPAN

LAUNCH VEHICLE- N-5H

SPONSORING COUNTRY/AGENCY
JAPAN

ISAS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 533. MIN
PERIAPSIS- 230. KM ALT

EPOCH DATE- 09/16/78
INCLINATION- 31. DEG
APOAPSIS- 30558. KM ALT

PERSONNEL

PM - T. OYASHI
PS - N. KAWASHIMA
PS - H. OYA
PS - A. NISHIDA

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BRIEF DESCRIPTION

THIS MISSION WAS PART OF THE JAPANESE CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY, AND CARRIED OUT COORDINATED OBSERVATIONS WITH KYOKKO. INVESTIGATIONS OF CORRELATED MECHANISMS BETWEEN PARTICLES AND FIELDS AND PLASMA TURBULENCE WERE MADE BY MAKING OBSERVATIONS OF THE DETAILED STRUCTURE OF THE PLASMASPHERE WITH IN SITU MEASUREMENT TECHNIQUES USING PLASMA WAVE PHENOMENA AND ELECTROSTATIC PARTICLE ANALYZERS. THE SPACECRAFT, A 12-SIDED POLYGON, CARRIED DIPOLE EXTENDABLE ANTENNAS WITH LENGTHS OF 103 M AND 69.6 M AND A 1-M BOOM FOR A VECTOR MAGNETOMETER. A SOLAR PANEL ARRAY PROVIDED 30 W INTO A BATTERY AND REGULATOR SYSTEM. THE SPACECRAFT SPIN STABILIZED AT 150 RPM, DROPPING TO 3 RPM WHEN THE TWO SETS OF ANTENNAS WERE EXTENDED. ATTITUDE WAS MEASURED WITH A SUN SENSOR TO AN ACCURACY OF 0.5 DEG. A 0.5-W 136-MHZ PCM/PM TELEMETRY SYSTEM HANDLED 256 OR 1024 BPS, AND A 2-W 400-MHZ PM SYSTEM HANDLED WIDEBAND 10-KHZ OR 3-KHZ DATA. DATA ACQUISITION WAS REAL TIME EXCEPT FOR A 10K-BYTE MEMORY FOR HOUSEKEEPING AND PLASMA PARAMETER DATA.

----- JIKIKEN, EJIRI -----

INVESTIGATION NAME- IMPEDANCE AND ELECTRIC FIELD (IEF)

NSSDC ID- 78-087A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M. EJIRI
OI - A. NISHIDA
OI - Y. WATANABE
OI - T. OGAWA

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BRIEF DESCRIPTION

A SWEEP-FREQUENCY IMPEDANCE PROBE MEASURED FROM .02 TO 3 MHZ USING A 103-M (TIP-TO-TIP) ANTENNA. THIS PROVIDED BASIC DATA FOR CALIBRATION OF NATURAL PLASMA WAVE DETECTIONS AND DATA FOR THE ESTIMATION OF THE TRANSMISSION EFFICIENCY FOR PLASMA WAVE STIMULATIONS. ELECTRON DENSITY WAS MEASURED INDEPENDENTLY OF ALL OTHER TECHNIQUES, AND MEASURED ACCURATELY BY CANCELING STRAY CAPACITANCE. USING THIS SAME ANTENNA, ELECTRIC FIELDS FROM DC TO 1 KHZ WERE MEASURED. THE SPACECRAFT BODY WAS COATED WITH CONDUCTIVE MATERIALS TO AVOID THE GENERATION OF LOCAL ELECTRIC FIELDS, SO THAT ACCURATE MEASUREMENTS OF NATURAL FIELDS COULD BE MADE.

----- JIKIKEN, KAWASHIMA -----

INVESTIGATION NAME- CONTROLLED ELECTRON BEAM EMISSIONS (CBE)

NSSDC ID- 78-087A-07

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - N. KAWASHIMA
OI - S. MURASATO

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U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED IMPORTANT EFFECTS FOR THE ANALYSES OF WAVE/PARTICLE INTERACTIONS. SPACECRAFT POTENTIAL WAS CONTROLLED BY THE EMISSION OF ELECTRON BEAMS THAT COULD BE VARIED IN ENERGY FROM 1 TO 200 EV IN 4 STEPS TO ALLOW OTHER INSTRUMENTS TO MAKE ACCURATE MEASUREMENTS OF LOW-ENERGY IONS AND ELECTRONS. THE BEAMS COULD ALSO CAUSE PLASMA INSTABILITIES THAT RESULTED IN THE PRODUCTION OF MANY KINDS OF PLASMA WAVES. BEAM CURRENTS OF 0.25, 0.5, 0.75, AND 1.0 MA COULD BE SELECTED FOR ANY ENERGY. OR AN AUTOMATIC MODE COULD BE SELECTED WHERE ENERGY AND BEAM CURRENT WERE CHANGED EVERY 8 OR 32 S.

----- JIKIKEN, KIMURA -----

INVESTIGATION NAME- VLF DOPPLER PROPAGATION (DPL)

NSSDC ID- 78-087A-03

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - I. KIMURA
OI - K. HASHIMOTO

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BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED DETECTING THE NWC 22.3-KHZ SIGNAL TRANSMITTED REGULARLY FROM AUSTRALIA WITH ONE OF THE TWO LONG DIPOLE ANTENNAS (69.6 M AND 103 M TIP-TO-TIP) EXTENDED PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THIS SIGNAL WAS HETERODYNED DOWN TO 590 HZ, AMPLIFIED WITH A BANDWIDTH OF 100 HZ, AND TRANSMITTED TO THE GROUND ON A WIDEBAND ANALOG CHANNEL. THE ELECTRIC FIELD INTENSITY OF THE NWC SIGNAL WAS TELEMETRED VIA THE PCM SYSTEM. THE ANTENNA IMPEDANCE WAS ALSO OBSERVED.

----- JIKIKEN, KUBO -----

INVESTIGATION NAME- ENERGY SPECTRUM OF PARTICLES (ESP)

NSSDC ID- 78-087A-06

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H. KUBO
OI - N. KAWASHIMA
OI - T. MUKAI
OI - T. ARAKAWA

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BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A HEMISPHERICAL ELECTROSTATIC ANALYZER FOR ELECTRONS AND A CYLINDRICAL ONE FOR IONS. THE ENERGY RANGE FOR ELECTRONS WAS 5 EV TO 11 KEV AND FOR IONS WAS 0.02 TO 30 KEV/Q. THE ENERGY RESOLUTION FOR BOTH ANALYZERS (DELTA E/E) WAS 0.6. BESIDES BEING USED TO OBTAIN SPECTRA, THE INSTRUMENT WAS USED TO INVESTIGATE WAVE-PARTICLE INTERACTIONS AND DETERMINE THE RESPONSE OF THE MAGNETOSPHERIC PLASMA WHEN EITHER THE STIMULATED PLASMA WAVE TRANSMITTER OR THE CONTROLLED ELECTRON BEAM EXPERIMENT WAS OPERATING.

----- JIKIKEN, OYA -----

INVESTIGATION NAME- STIMULATED PLASMA WAVE (SPW)

NSSDC ID- 78-087A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - H. OYA
OI - T. KANADA
OI - T. ONO

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BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO EXCITE PLASMA WAVES BY TRANSMITTING 300-W PULSES FROM A 103-M (TIP-TO-TIP) ANTENNA IN THE FREQUENCY RANGE .02 TO 3 MHZ. THE FREQUENCY COULD BE CHANGED IN A CONTINUOUS SWEEP OR STEPPED THROUGH FIXED FREQUENCIES TO OBTAIN ELECTRON TEMPERATURE, TEMPERATURE ANISOTROPY, AND ELECTRON DENSITY. PLASMA INSTABILITIES AND NONLINEAR WAVE/PARTICLE INTERACTIONS WERE STUDIED.

----- JIKIKEN, OYA -----

INVESTIGATION NAME- NATURAL PLASMA WAVES (NPW)

NSSDC ID- 78-087A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H. OYA
OI - M. MATSUMOTO
OI - J. OHTSU
OI - A. MORIOKA
OI - T. MIYATAKE
OI - I. KIMURA
OI - H. MIYAKA

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BRIEF DESCRIPTION

THIS EXPERIMENT USED A 103-M (TIP-TO-TIP) DIPOLE ANTENNA, OR A CORED LOOP ANTENNA CONSISTING OF 76 TURNS WITH A DIAMETER OF 15.5 CM, FOR DETECTING VLF WAVES IN THE PLASMASPHERE, ELECTROSTATIC PLASMA WAVES IN THE MAGNETOSPHERE, AND RADIO WAVES FROM THE EARTH AND PLANETS. THE DIPOLE WAS USED TO DETECT HECTOMETER AND DECAETER WAVES FROM THE PLANETS, AS WELL AS TERRESTRIAL KILOMETRIC WAVES, IN THE RANGE 0.02-3 MHZ. VLF WAVES UP TO 10 KHZ WERE DETECTED USING THE DIPOLE AND A WIDEBAND RECEIVER. ION WAVES (0.1-1 KHZ) AND PLASMA WAVES (0.1-1.0 MHZ) WERE DETECTED IN THE NEAR-EARTH PORTION OF THE ORBIT. CORRELATED OBSERVATIONS WITH THE VLF TRANSMITTER AT SIPLE STATION WERE PLANNED. FLUCTUATIONS OF THE ELECTRIC FIELD UP TO 450 HZ WERE OBTAINED WITH A LANGMUIR PROBE. THE BANDWIDTH AND SWEEP TIME OF THE FREQUENCY ANALYZER COULD BE SELECTED BY CHOOSING ONE OF FOUR MODES: NPW-A, -V, -VL, AND

-5.

***** LANDSAT 2*****

SPACECRAFT COMMON NAME- LANDSAT 2
ALTERNATE NAMES- EARTH RES TECH SAT.-B, PL-7330
ERTS-B, 07615

NSSDC ID- 75-004A

LAUNCH DATE- 01/22/75 WEIGHT- 816. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/25/75
ORBIT PERIOD- 103.28 MIN INCLINATION- 98.09 DEG
PERIAPSIS- 907. KM ALT APOAPSIS- 918. KM ALT

PERSONNEL
MG - J. MELCH NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - S.C. FREDEN NASA-GSFC

BRIEF DESCRIPTION

LANDSAT 2 WAS THE SECOND OF A SERIES OF MODIFIED NIMBUS SATELLITES. THE NEAR-POLAR ORBITING SPACECRAFT SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES, THE SPACECRAFT WAS EQUIPPED WITH (1) A FIVE-CHANNEL MULTISPECTRAL SCANNER (MSS) AND A THREE-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT 2 CARRIED TWO WIDE-BAND VIDEO TAPE RECORDERS (WBVTR), CAPABLE OF STORING UP TO 30 MIN OF SCANNER OR CAMERA DATA TO GIVE THE SPACECRAFT'S SENSORS A NEAR-GLOBAL COVERAGE CAPABILITY. AN ADVANCED ATTITUDE CONTROL SYSTEM CONSISTING OF HORIZON SCANNERS, SUN SENSORS, AND A COMMAND ANTENNA COMBINED WITH A FRION GAS PROPULSION SYSTEM, PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 0.7 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDED A COMMAND SUBSYSTEM OPERATING AT 154.2 AND 2106.4 MHZ AND A PCM NARROW-BAND TELEMETRY SUBSYSTEM, OPERATING AT 2287.5 AND 137.86 MHZ, FOR SPACECRAFT HOUSEKEEPING, ATTITUDE, AND SENSOR PERFORMANCE DATA. VIDEO DATA FROM THE THREE-CAMERA RBV SYSTEM WAS TRANSMITTED IN BOTH REAL TIME AND FROM WBVTR AT 2276.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BAND, 10TH AT 2229.5 MHZ.

----- LANDSAT 2, HALLA-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 75-004A-02 INVESTIGATIVE PROGRAM
CODE EN
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - J.A. HALLA NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 2 MULTISPECTRAL SCANNER (MSS) WAS DESIGNED TO PROVIDE REPETITIVE DAY-NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION WAS TO OBTAIN INFORMATION IN VARIOUS AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY, THE MSS SYSTEM WAS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTED OF A 22.86-CM DOUBLE REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATED IN THE FOLLOWING SPECTRAL INTERVALS -- HAND 1 - 0.5 TO 0.6 MICROMETER, HAND 2 - 0.6 TO 0.7 MICROMETER, HAND 3 - 0.7 TO 0.8 MICROMETER, HAND 4 - 0.8 TO 1.1 MICROMETERS, AND HAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST HAND, WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, GAVE LANDSAT 2 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS ON LANDSAT 1. INCOMING RADIATION WAS COLLECTED BY THE SCANNING MIRROR, WHICH OSCILLATED 2.89 DEG TO EITHER SIDE OF NADIR AND SCANNED CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN WAS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE WAS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL WAS ACCOMPLISHED. OPTICAL FILTERS WERE USED TO PRODUCE THE DESIRED SPECTRAL SEPARATION. SIX DETECTORS WERE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL HANDS AND TWO IN THE FIFTH HAND -- HANDS 1 THROUGH 3 USED PHOTOMULTIPLIER TUBES AS DETECTORS, HAND 4 USED SILICON PHOTODIODES, AND HAND 5 USED MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLEXER INCLUDED IN

THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLEXED AND THEN CONVERTED TO A PULSE-CODE MODULATED SIGNAL BY AN A/D CONVERTER. THE DATA WERE THEN TRANSMITTED (AT 2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR STORED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK THE NEXT TIME THE SPACECRAFT CAME WITHIN COMMUNICATION RANGE OF AN ACQUISITION STATION. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES SECTION. ALL OTHER INTERESTED INDIVIDUALS MAY OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

***** LANDSAT 3*****

SPACECRAFT COMMON NAME- LANDSAT 3
ALTERNATE NAMES- EARTH RES TECH SAT.-C, ERTS-C
10702, LANDSAT-C

NSSDC ID- 78-026A

LAUNCH DATE- 03/05/77 WEIGHT- 960. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 03/06/77
ORBIT PERIOD- 103.1 MIN INCLINATION- 99.1 DEG
PERIAPSIS- 897. KM ALT APOAPSIS- 914. KM ALT

PERSONNEL
MG - J.C. MELCH NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - S.C. FREDEN NASA-GSFC

BRIEF DESCRIPTION

LANDSAT 3 WAS A MODIFIED VERSION OF THE NIMBUS SATELLITE, WITH THE GENERAL MISSION OBJECTIVES OF EXTENDING THE PERIOD OF SPACE-DATA ACQUISITION FOR EARTH RESOURCES INITIATED BY LANDSAT 1 (FORMERLY ERTS 1) AND CONTINUED BY LANDSAT 2. THE NEAR-POLAR ORBITING SPACECRAFT SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES, THE SPACECRAFT WAS EQUIPPED WITH (1) A FIVE-CHANNEL MULTISPECTRAL SCANNER (MSS) AND A TWO-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, AND (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT 3 CARRIED TWO WIDE-BAND VIDEO TAPE RECORDERS (WBVTR) CAPABLE OF STORING UP TO 30 MIN OF SCANNER OR CAMERA DATA TO GIVE THE SPACECRAFT'S SENSORS A NEAR-GLOBAL COVERAGE CAPABILITY. AN ADVANCED ATTITUDE CONTROL SYSTEM, CONSISTING OF HORIZON SCANNERS, SUN SENSORS, AND A COMMAND ANTENNA COMBINED WITH FRION GAS PROPULSION SYSTEM, PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1.0 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDED A COMMAND SUBSYSTEM, OPERATING AT 154.2 AND 2106.4 MHZ, AND A PCM NARROW-BAND TELEMETRY SUBSYSTEM, OPERATING AT 2287.5 AND 137.86 MHZ, FOR SPACECRAFT HOUSEKEEPING, ATTITUDE, AND SENSOR PERFORMANCE DATA. VIDEO DATA FROM THE TWO-CAMERA RBV SYSTEM WERE TRANSMITTED IN BOTH REAL TIME AND FROM THE WIDE-BAND RECORDER SYSTEM AT 2265.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

----- LANDSAT 3, HALLA-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 78-026A-02 INVESTIGATIVE PROGRAM
CODE EN
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - J.A. HALLA NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 MULTISPECTRAL SCANNER (MSS) PROVIDED REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION WAS TO OBTAIN DATA IN VARIOUS AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY, THE MSS SYSTEM WAS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTED OF A DOUBLE REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATED IN THE FOLLOWING SPECTRAL INTERVALS: HAND 1 - 0.5 TO 0.6 MICROMETER, HAND 2 - 0.6 TO 0.7 MICROMETER, HAND 3 - 0.7 TO 0.8 MICROMETER, HAND 4 - 0.8 TO 1.1 MICROMETERS, AND HAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST HAND, WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, GAVE LANDSAT 3 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS IN

LANDSAT 1. INCOMING RADIATION WAS COLLECTED BY THE SCANNING SYSTEM, WHICH OSCILLATED 2.49 DEG TO EITHER SIDE OF NADIR AND PRODUCED CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN WAS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE WAS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL WAS ACCOMPLISHED. OPTICAL FILTERS WERE USED TO PRODUCE THE DESIRED SPECTRAL SEPARATION. SIX DETECTORS WERE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND: BANDS 1 THROUGH 3 USED PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USED SILICON PHOTODIODES, AND BAND 5 USED MERCURY-CADMIUM-TELLURIDE DETECTORS. THE MINIMUM DIMENSIONS THAT WERE RESOLVED BY THE MSS WERE 80 M FOR BANDS 1 THROUGH 4 AND 240 M FOR BAND 5. A MULTIPLIER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLIED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA WERE TRANSMITTED (AT 2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR STORED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK THE NEXT TIME THE SPACECRAFT WAS WITHIN COMMUNICATION RANGE OF AN ACQUISITION STATION. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE MADE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT 3, GILBERT -----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-026A-01

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS
EARTH RESOURCES SURVEY

PERSONNEL

PI - L. L. GILBERT

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 DATA COLLECTION SYSTEM (DCS) PROVIDED USERS WITH NEAR REAL-TIME DATA COLLECTED FROM VARIOUS REMOTE LOCATIONS. THE DCS WAS COMPOSED OF (1) THE DATA COLLECTION PLATFORMS (DCP'S) WHICH MIGHT HAVE BEEN OCEAN BUOYS, CONSTANT PRESSURE BALLOONS, OR AUTOMATIC GROUND STATIONS, (2) THE SATELLITE EQUIPMENT, AND (3) THE GROUND DATA CENTERS, INCLUDING REMOTE RECEIVING SITES AND THE GROUND DATA HANDLING SYSTEM AT GSFC. USE OF THE LANDSAT SPACEBORNE DCS PROVIDED A CONTINUAL FLOW OF INFORMATION FOR BETTER MANAGEMENT OF WILDLIFE, MARINE, AGRICULTURE, WATER, AND FORESTRY RESOURCES AND LED TO IMPROVED WEATHER FORECASTS, POLLUTION CONTROL, AND EARTHQUAKE PREDICTION AND WARNING. THE ENVIRONMENTAL SENSORS MOUNTED ON A DCP WERE SELECTED BY INDIVIDUAL INVESTIGATORS TO SATISFY THEIR PARTICULAR REQUIREMENTS. FROM A PLANNED ORBIT OF 912 KM, THE SPACECRAFT WAS CAPABLE OF ACQUIRING DATA FROM DCP'S WITHIN A RADIUS OF APPROXIMATELY 5100 KM FROM THE SATELLITE POINT, THUS ALLOWING DATA TO BE OBTAINED FROM ANY REMOTE PLATFORM AT LEAST ONCE EVERY 12 H. THE DCP'S TRANSMIT AT 401.55 MHZ. THE DCS EQUIPMENT, ESSENTIALLY A RECEIVER, RECEIVED AND RETRANSMITTED DATA (AT 2227.5 MHZ) TO SELECTED GROUND RECEIVING STATIONS. THERE WAS NO SIGNAL MULTIPLEXING OR DATA PROCESSING ON THE SATELLITE. THE LANDSAT 3 DCS ACCOMMODATED UP TO 1000 DCP'S DEPLOYED THROUGHOUT THE CONTINENTAL US. DATA FROM THIS EXPERIMENT WERE HANDLED AND DISTRIBUTED TO THE VARIOUS PLATFORM INVESTIGATORS BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD.

----- LANDSAT 3, WEINSTEIN -----

INVESTIGATION NAME- RETURN BEAM VIDICON CAMERA (RBV)

NSSDC ID- 78-026A-01

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL

PI - O. WEINSTEIN

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 RETURN BEAM VIDICON (RBV) CAMERA SYSTEM CONTAINED TWO IDENTICAL CAMERAS COVERING THE SPECTRAL BAND FROM 0.53 TO 0.75 MICROMETER. THE TWO EARTH-ORIENTED CAMERAS WERE MOUNTED ON A COMMON BASE, STRUCTURALLY ISOLATED FROM THE SPACECRAFT TO MAINTAIN ACCURATE ALIGNMENT. EACH CAMERA CONTAINED AN OPTICAL LENS, A RBV SENSOR, A THERMOELECTRIC COOLER, DEFLECTION AND FOCUS COILS, A MECHANICAL SHUTTER, ERASE LAMPS, AND SENSOR ELECTRONICS. THE CAMERAS WERE ALIGNED TO VIEW ADJACENT 84-KM SQUARE GROUND SCENES WHICH OVERLAPPED SLIGHTLY SO THAT THE TOTAL WIDTH OF THE GROUND SCENE WAS 185 KM. THE CAMERAS WERE OPERATED EVERY 12.5 S TO PRODUCE OVERLAPPING IMAGES ALONG THE DIRECTION OF SPACECRAFT MOTION. AFTER SHUTTERING, THE IMAGE WAS SCANNED BY AN ELECTRON BEAM TO PRODUCE A VIDEO OUTPUT SIGNAL. THE TIMING CYCLE WAS ARRANGED SO THAT A 3.5-S OFFSET WAS INTRODUCED BETWEEN THE READOUTS OF THE TWO CAMERAS, PERMITTING SEQUENTIAL READOUT OF THE CAMERAS, ALLOWING THE SAME TAPE RECORDER AND COMMUNICATIONS CHANNEL TO BE USED. VIDEO DATA FROM THE RBV WERE TRANSMITTED (AT 2269.4 MHZ) IN BOTH REAL-TIME AND TAPE-RECORDER MODES. FROM A NOMINAL SPACECRAFT ALTITUDE OF 912 KM, THE RBV HAD A GROUND RESOLUTION

OF 40 M (TWICE THE LANDSAT 1 RESOLUTION OF 80 M). DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE MADE AVAILABLE TO APPROVED INVESTIGATORS AND AGENCIES THROUGH ITS LANDSAT USERS SERVICES SECTION. ALL OTHER INTERESTED INDIVIDUALS CAN OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

***** MAGION*****

SPACECRAFT COMMON NAME- MAGION
ALTERNATE NAMES- 11110

NSSDC ID- 78-099C

LAUNCH DATE- 10/24/78
LAUNCH SITE- PLESEISK, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

WEIGHT- 15. KG

SPONSORING COUNTRY/AGENCY
U.S.S.R.
CZECHOSLOVAKIA

INTERCOS
CAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.4 MIN
PERIAPSIS- 407. KM ALT

EPOCH DATE- 10/25/78
INCLINATION- 82.96 DEG
APOAPSIS- 768. KM ALT

PERSONNEL

PS - P. TRISKA

GEOPHYS INST CAS

BRIEF DESCRIPTION

MAGION WAS A CZECHOSLOVAKIAN SUBSATELLITE THAT SEPARATED FROM INTERCOSMOS 18 ON NOV. 14, 1978. IT WAS MAGNETICALLY STABILIZED AND WAS DESIGNED TO CARRY IONOSPHERIC-TYPE EXPERIMENTS RELATED TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). MAGION HAD A PRISMATIC SHAPE (1.3 X 1.3 X 1.5 M) AND FOLLOWED THE ORBIT OF INTERCOSMOS 18. CZECHOSLOVAK PARTICIPATION IN STUDIES OF MUTUAL RELATIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND IONOSPHERE CONSISTED MAINLY OF MEASURING VLF PHENOMENA ON BOARD THE CZECHOSLOVAK-MADE MAGION, MOVING SLOWLY AWAY FROM INTERCOSMOS 18, AND IN COOPERATING IN THE MEASUREMENTS OF PLASMA PROPERTIES IN THE VICINITY OF THIS SATELLITE.

----- MAGION, TRISKA -----

INVESTIGATION NAME- ELF AND VLF RECEIVERS

NSSDC ID- 78-099C-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SPACE PLASMA
PARTICLES AND FIELDS

PERSONNEL

PI - P. TRISKA
OI - P. JIRICEK

CZECH ACAD OF SCI
CZECH ACAD OF SCI

BRIEF DESCRIPTION

THIS INVESTIGATION WAS DESIGNED TO UTILIZE SIMULTANEOUS MEASUREMENTS MADE ON THE NEARBY PARENT SPACECRAFT INTERCOSMOS 18, MAGION (78-099A). FIVE PARTS OF THE EXPERIMENT WERE IDENTIFIED. (1) ELECTRIC AND MAGNETIC FIELDS FROM 0.05 TO 0.16 KHZ WERE MEASURED IN A BROADBAND CHANNEL. (2) VLF NARROW-BAND CHANNELS WERE SET AT 0.45, 0.8, 1.95, 4.65, AND 15 KHZ. (3) THERE WAS A 16-CHANNEL FREQUENCY ANALYZER. (4) A RESONANCE EXCITER OPERATED, SWEEPING THE RANGE 0.8 TO 8 KHZ. (5) ELECTRIC FIELDS IN THE RANGE 0.01 TO 80 KHZ WERE MEASURED. DUE TO POWER LIMITATIONS, EXCEPT DURING THE SHORT INITIAL PHASE AFTER SEPARATION AND ACTIVATION, NOT ALL COMPONENTS WERE OPERATED SIMULTANEOUSLY. EITHER ELECTRIC FIELD BROADBAND, MAGNETIC FIELD BROADBAND, OR VLF NARROW-BAND CHANNELS AND PARTICLE DETECTORS COULD BE OPERATED.

----- MAGION, TRISKA -----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 78-099C-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - P. TRISKA
OI - P. JIRICEK

CZECH ACAD OF SCI
CZECH ACAD OF SCI

BRIEF DESCRIPTION

THIS INVESTIGATION WAS DESIGNED TO UTILIZE SIMULTANEOUS MEASUREMENTS MADE ON THE NEARBY PARENT SPACECRAFT INTERCOSMOS 18, MAGION (78-099A). THE DETECTORS WERE GEIGER-MULLER TUBES VIEWING IN TWO DIRECTIONS, PARALLEL AND PERPENDICULAR TO THE MAGNETIC ORIENTATION AXIS. ENERGY THRESHOLD WAS 37 KEV FOR ELECTRONS. DUE TO POWER LIMITATIONS, EXCEPT DURING THE SHORT

INITIAL PHASE AFTER SEPARATION AND ACTIVATION, NOT ALL INSTRUMENTS WERE OPERATED SIMULTANEOUSLY. EITHER ELECTRIC FIELD BROADBAND, MAGNETIC FIELD BROADBAND, OR VLF NARROW-BAND CHANNELS AND PARTICLE DETECTORS COULD BE OPERATED.

***** MAGSAT*****

SPACECRAFT COMMON NAME- MAGSAT
ALTERNATE NAMES- ALM-C, GLOBAL MAGNETIC SURV NSN
MAGSAT-A, 11604

NSSDC ID- 79-094A

LAUNCH DATE- 10/30/79 WEIGHT- 158.4 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/31/79
ORBIT PERIOD- 95.9 MIN INCLINATION- 96.8 DEG
PERIAPSIS- 351.9 KM ALT APOAPSIS- 578.4 KM ALT

PERSONNEL
MG - J.P. MURPHY NASA HEADQUARTERS
SC - J.V. TARANIK NASA HEADQUARTERS
PM - G.W. OUSLEY NASA-USFC
PS - R.A. LANGE NASA-USFC

BRIEF DESCRIPTION
THE MAGSAT PROJECT WAS A JOINT NASA/UNITED STATES GEOLOGICAL SURVEY (USGS) EFFORT TO MEASURE NEAR-EARTH MAGNETIC FIELDS ON A GLOBAL BASIS. OBJECTIVES INCLUDED OBTAINING AN ACCURATE DESCRIPTION OF THE EARTH'S MAGNETIC FIELD, OBTAINING DATA FOR USE IN THE UPDATE AND REFINEMENT OF WORLD AND REGIONAL MAGNETIC CHARTS, COMPILATION OF A GLOBAL CRUSTAL MAGNETIC ANOMALY MAP, AND INTERPRETATION OF THAT MAP IN TERMS OF GEOLOGICAL/GEOPHYSICAL MODELS OF THE EARTH'S CRUST. THE SPACECRAFT WAS LAUNCHED INTO A LOW, NEAR-POLAR, ORBIT BY THE SCOUT VEHICLE. THE BASIC SPACECRAFT WAS MADE UP OF TWO DISTINCT PARTS: THE INSTRUMENT MODULE THAT CONTAINED A VECTOR AND A SCALAR MAGNETOMETER AND THEIR UNIQUE SUPPORTING GEAR; AND THE BASE MODULE THAT CONTAINED THE NECESSARY DATA-HANDLING, POWER, COMMUNICATIONS, COMMAND, AND ATTITUDE-CONTROL SUBSYSTEMS TO SUPPORT THE INSTRUMENT MODULE. THE BASE MODULE COMPLETE WITH ITS SUBSYSTEMS WAS COMPRISED OF RESIDUAL SMALL ASTRONOMY SATELLITE (SAS-2) HARDWARE. THE MAGNETOMETERS WERE DEPLOYED AFTER LAUNCH TO A POSITION 6 M BEHIND THE SPACECRAFT. AT THIS DISTANCE, THE INFLUENCE OF MAGNETIC MATERIALS FROM THE INSTRUMENT AND BASE MODULE (CHIEFLY FROM THE STAR CAMERAS) WAS LESS THAN 1 NT. FOR A LIST OF INVESTIGATORS WHO WILL USE ONE OR BOTH OF THE EXPERIMENTS LISTED BELOW AND THEIR INVESTIGATIONS, SEE APPENDIX B.

----- MAGSAT, LANGE

INVESTIGATION NAME- SCALAR MAGNETOMETER

NSSDC ID- 79-094A-01 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL
PI - R.A. LANGE NASA-USFC
OI - R.M. PARTNICK NASA-USFC

BRIEF DESCRIPTION
THE SCALAR MAGNETOMETER HAD TWO DUAL-CELL, CESIUM-VAPOR SENSOR HEADS WHOSE OUTPUT FREQUENCY WAS PROPORTIONAL TO THE TOTAL MAGNETIC FIELD. WITH THIS SENSOR CONFIGURATION, ONLY TWO SMALL DIAMOND-SHAPED DEAD ZONES EXIST. THESE LAY ALONG THE ORBIT NORMAL (THE EAST-WEST DIRECTION) FOR THE ORBIT AND ATTITUDE CHOSEN FOR THIS MISSION AND A DIRECTION IN WHICH THE MAGNETIC FIELD NEVER LAY. THE SCALAR MAGNETOMETER'S BASIC ACCURACY WAS ON THE ORDER OF 0.5 NT. A PERIOD COUNT SYSTEM CONVERTED THE MAGNETOMETER OUTPUT FREQUENCY TO A DIGITAL WORD ACCEPTABLE TO THE SPACECRAFT TELEMETRY SYSTEM. THIS DIGITAL DATA HAD A RESOLUTION AND ACCURACY OF BETWEEN 0.5 AND 1.0 NT IN THE RANGE 15,000 TO 60,000 NT. MOST OF THE TIME, NOISE ON THE SPACECRAFT RESULTED IN OPERATION OF ONLY ONE SENSOR AT A TIME.

----- MAGSAT, LANGE

INVESTIGATION NAME- VECTOR MAGNETOMETER

NSSDC ID- 79-094A-02 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL
PI - R.A. LANGE
OI - R.M. ACUNA

NASA-USFC
NASA-USFC

BRIEF DESCRIPTION
THE VECTOR MAGNETOMETER CONSISTED OF THREE FLUXGATE SENSING ELEMENTS ALIGNED ALONG ORTHOGONAL AXES. THE OUTPUT OF EACH VECTOR SENSOR WAS CONVERTED TO A DIGITAL WORD BY AN ANALOG-TO-DIGITAL CONVERTER. THE OUTPUTS OF ALL THREE AXES WERE SAMPLED ESSENTIALLY SIMULTANEOUSLY. EACH VECTOR MEASUREMENT HAD A RESOLUTION OF BETTER THAN 1 NT AND AN ABSOLUTE ACCURACY OF BETTER THAN 6 NT RMS WHEN REFERENCED TO A GEOCENTRIC COORDINATE SYSTEM. THE MEASUREMENT RANGE WAS PLUS OR MINUS 60,000 NT.

***** METEOSAT 1*****

SPACECRAFT COMMON NAME- METEOSAT 1
ALTERNATE NAMES- METEOROLOGICAL SAT-A, METOSAT
10489

NSSDC ID- 77-108A

LAUNCH DATE- 11/23/77 WEIGHT- 625.6 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/24/77
ORBIT PERIOD- 1411.5 MIN INCLINATION- 0.7 DEG
PERIAPSIS- 34913. KM ALT APOAPSIS- 35692. KM ALT

PERSONNEL
PM - J. AASTED ESA-TOULOUSE

BRIEF DESCRIPTION
METEOSAT WAS A GEOSTATIONARY SPACECRAFT THAT SERVED AS PART OF EUROPEAN SPACE AGENCY'S (ESA) CONTRIBUTION TO GARP. AS PART OF GARP, THE SATELLITE HELPED TO SUPPLY DATA REQUIRED FOR GLOBAL DATA SETS USED IN IMPROVEMENT OF MACHINE WEATHER FORECASTS. IN GENERAL, THE SPACECRAFT DESIGN, INSTRUMENTATION, AND OPERATION WERE SIMILAR TO SMS/GOES. THE SPIN-STABILIZED SPACECRAFT CARRIED (1) A VISIBLE-IR RADIOMETER TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION SYSTEM TO DISSEMINATE IMAGE DATA TO USER STATIONS, TO COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND TO RELAY DATA FROM POLAR-ORBITING SATELLITES. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 210 CM IN DIAMETER AND 430 CM IN LENGTH, INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS WERE AN EQUIPMENT PLATFORM AND A CENTRAL TUBE. THE RADIOMETER TELESCOPE WAS MOUNTED ON THE EQUIPMENT PLATFORM AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE CENTRAL TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE CENTRAL TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT AND BATTERIES. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY JET THRUSTERS MOUNTED ON THE SPACECRAFT AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-HAND AND S-HAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED SYNCHRONOUS ORBIT. METEOSAT 1 WAS PLACED IN GEOSYNCHRONOUS ORBIT NEAR THE PRIME MERIDIAN.

----- METEOSAT 1, DIETHELM

INVESTIGATION NAME- DATA COLLECTION PLATFORM (COM)

NSSDC ID- 77-108A-02 INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - G. DIETHELM ESA-TOULOUSE

BRIEF DESCRIPTION
THE DATA COLLECTION PLATFORM WAS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FROM POLAR-ORBITING SATELLITES. THIS EXPERIMENT WAS SIMILAR TO THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (MTATS) FLOWN ON SMS 1, SMS 2, AND GOES SERIES SPACECRAFT. THIS EXPERIMENT OPERATED ON S-HAND FREQUENCIES FOR WEFAX TYPE TRANSMISSIONS AND UHF FOR DATA COLLECTION PLATFORM REPORT AND INTERROGATION.

***** METEOSAT 2*****

SPACECRAFT COMMON NAME- METEOSAT 2
ALTERNATE NAMES- METEOROLOGICAL SAT-N, METEOSAT-B

NSSDC ID- 81-057A

LAUNCH DATE- 06/19/81 WEIGHT- 625.8 KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE-
ORBIT PERIOD- 1440. MIN INCLINATION- 0. DEG
PERIAPSIS- 35600. KM ALT APOAPSIS- 35600. KM ALT

PERSONNEL
PM - J. AASTED ESA-TOULOUSE

BRIEF DESCRIPTION
METEOSAT 2 WAS A GEOSTATIONARY SPACECRAFT AND SERVED AS PART OF THE EUROPEAN SPACE AGENCY'S (ESA) CONTRIBUTION TO GARP. AS PART OF GARP, THE SATELLITE HELPED TO SUPPLY DATA REQUIRED FOR GLOBAL DATA SETS USED IN IMPROVEMENT OF MACHINE WEATHER FORECASTS. IN GENERAL, THE SPACECRAFT DESIGN, INSTRUMENTATION, AND OPERATION WERE SIMILAR TO SMS/GOES. THE SPIN-STABILIZED SPACECRAFT CARRIED (1) A VISIBLE-IR RADIOMETER THAT PROVIDED HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TOOK RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION SYSTEM THAT DISSEMINATED IMAGE DATA TO USER STATIONS, COLLECTED DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND RELAYED DATA FROM POLAR-ORBITING SATELLITES. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 210 CM IN DIAMETER AND 430 CM IN LENGTH, INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS WERE AN EQUIPMENT PLATFORM AND A CENTRAL TUBE. THE RADIOMETER TELESCOPE WAS MOUNTED ON THE EQUIPMENT PLATFORM AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE CENTRAL TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE CENTRAL TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT AND BATTERIES. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY JET THRUSTERS MOUNTED ON THE SPACECRAFT AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT.

----- METEOSAT 2, DIETERLE-----

INVESTIGATION NAME- DATA COLLECTION PLATFORM (DCP)

NSSDC ID- 81-057A-02 INVESTIGATIVE PROGRAM
COMMUNICATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - G. DIETERLE ESA-TOULOUSE

BRIEF DESCRIPTION
THE DATA COLLECTION PLATFORM WAS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FROM POLAR ORBITING SATELLITES. THIS EXPERIMENT WAS SIMILAR TO THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (WEFAX) FLOWN ON SMS 1, SMS 2, AND GOES SERIES SPACECRAFT. THIS EXPERIMENT OPERATED ON S-BAND FREQUENCIES FOR WEFAX TYPE TRANSMISSIONS AND UHF FOR DATA COLLECTION PLATFORM REPORT AND INTERROGATION.

----- METEOSAT 2, REYNOLDS-----

INVESTIGATION NAME- IMAGING RADIOMETER

NSSDC ID- 81-057A-01 INVESTIGATIVE PROGRAM
APPLICATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - M. REYNOLDS ESA-TOULOUSE

BRIEF DESCRIPTION
THE VISIBLE-IR RADIOMETER FLOWN ON METEOSAT 2 WAS CAPABLE OF PROVIDING DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED SATELLITE FOR USE IN (1) OPERATIONAL WEATHER ANALYSIS AND FORECASTING AND, (2) FOR SUPPORT TO GARP. THE FIVE-CHANNEL INSTRUMENT WAS ABLE TO TAKE FULL PICTURES OF THE EARTH'S DISK. THE THREE IR CHANNELS (TWO IN THE 10.5- TO 12.5-MICROMETER REGION AND ONE IN THE 5.7- TO 7.1-MICROMETER REGION), AND THE TWO VISIBLE CHANNELS (0.5- TO 0.9-MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING

RADIATION WAS RECEIVED BY A SCAN MIRROR AND COLLECTED BY AN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE RADIOMETER OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR AT THE COMPLETION OF EACH SPIN. RESOLUTION AT THE SUB-SATELLITE POINT WAS 2.5 KM FOR THE VISIBLE, AND 5 KM FOR THE IR, AND WATER-VAPOR CHANNELS.

***** NIMBUS 4*****

SPACECRAFT COMMON NAME- NIMBUS 4
ALTERNATE NAMES- NIMBUS-B, PL-701E
04362

NSSDC ID- 70-025A

LAUNCH DATE- 04/08/70 WEIGHT- 620. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/09/70
ORBIT PERIOD- 107.2 MIN INCLINATION- 80.114 DEG
PERIAPSIS- 1092. KM ALT APOAPSIS- 1108. KM ALT

PERSONNEL
MG - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - A.J. FLEIG NASA-GSFC

BRIEF DESCRIPTION
NIMBUS 4, THE FOURTH IN A SERIES OF SECOND-GENERATION METEOROLOGICAL RESEARCH AND DEVELOPMENT SATELLITES, WAS DESIGNED TO SERVE AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED METEOROLOGICAL SENSOR SYSTEMS, AND FOR COLLECTING METEOROLOGICAL DATA. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A RING-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) THE CONTROL SYSTEM HOUSING. THE SOLAR PADDLES AND THE CONTROL SYSTEM WERE CONNECTED TO THE SENSOR MOUNT BY A TRUSS STRUCTURE, GIVING THE SATELLITE THE APPEARANCE OF AN OCEAN BUOY. NIMBUS 4 WAS NEARLY 3.7 M TALL, 1.45 M IN DIAMETER AT THE BASE, AND ABOUT 3 M ACROSS WITH SOLAR PADDLES EXTENDED. THE TORUS-SHAPED SENSOR MOUNT, WHICH FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS RING PROVIDED MOUNTING SPACE FOR SENSORS AND TELEMETRY ANTENNAS. AN H-FRAME STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS, PROVIDED SUPPORT FOR THE LARGER EXPERIMENTS AND TAPE RECORDERS. MOUNTED ON THE CONTROL SYSTEM HOUSING, WHICH WAS ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, GAS NOZZLES FOR ATTITUDE CONTROL, AND A COMMAND ANTENNA. USE OF AN ADVANCED ATTITUDE CONTROL SUBSYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG FOR ALL THREE AXES (PITCH, ROLL, AND YAW). PRIMARY EXPERIMENTS CONSISTED OF (1) AN IMAGE DISSECTOR CAMERA SYSTEM (IDCS) FOR PROVIDING DAYTIME CLOUDCOVER PICTURES, BOTH IN REAL-TIME AND RECORDED MODES, (2) A TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) FOR MEASURING DAYTIME AND NIGHTTIME SURFACE AND CLOUDTOP TEMPERATURES AS WELL AS THE WATER VAPOR CONTENT OF THE UPPER ATMOSPHERE, (3) AN INFRARED INTERFEROMETER SPECTROMETER (IRIS) FOR MEASURING THE EMISSION SPECTRA OF THE EARTH/ATMOSPHERE SYSTEM, (4) A SATELLITE INFRARED SPECTROMETER (SIRS) FOR DETERMINING THE VERTICAL PROFILES OF TEMPERATURE AND WATER VAPOR IN THE ATMOSPHERE, (5) A MONITOR OF ULTRAVIOLET SOLAR ENERGY (MUSE) FOR DETECTING SOLAR UV RADIATION, (6) A BACKSCATTER ULTRAVIOLET (BUV) DETECTOR FOR MONITORING THE VERTICAL DISTRIBUTION AND TOTAL AMOUNT OF ATMOSPHERIC OZONE ON A GLOBAL SCALE, (7) A FILTER WEDGE SPECTROMETER (FWS) FOR ACCURATE MEASUREMENT OF IR RADIANCE AS A FUNCTION OF WAVELENGTH FROM THE EARTH/ATMOSPHERE SYSTEM, (8) A SELECTIVE (HOPPER RADIOMETER (SCB) FOR DETERMINING THE TEMPERATURES OF SIX SUCCESSIVE 10-KM LAYERS IN THE ATMOSPHERE FROM ABSORPTION MEASUREMENTS IN THE 15-MICROMETER CO2 BAND, AND (9) AN INTERROGATION, RECORDING, AND LOCATION SYSTEM (IRLS) FOR LOCATING, INTERROGATING, RECORDING, AND RETRANSMITTING METEOROLOGICAL AND GEOPHYSICAL DATA FROM REMOTE COLLECTION STATIONS.

----- NIMBUS 4, HEATH-----

INVESTIGATION NAME- BACKSCATTER ULTRAVIOLET (BUV)
SPECTROMETER

NSSDC ID- 70-025A-05 INVESTIGATIVE PROGRAM
CODE ED
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - D.F. HEATH
OI - J.V. DAVE
OI - A.J. KRUEGER
OI - C.L. HATEER

NASA-GSFC
IBM CORPORATION
NASA-GSFC
ENVIRONMENT CANADA

BRIEF DESCRIPTION

THE NIMBUS 4 BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER EXPERIMENT WAS DESIGNED TO MONITOR THE VERTICAL DISTRIBUTION AND TOTAL AMOUNT OF ATMOSPHERIC OZONE ON A GLOBAL SCALE BY MEASURING THE INTENSITY OF UV RADIATION BACKSCATTERED BY THE EARTH/ATMOSPHERE SYSTEM DURING DAY AND NIGHT IN THE 2500- TO 3400-A SPECTRAL BAND. THE PRIMARY INSTRUMENTATION CONSISTED OF A DOUBLE MONOCHROMATOR CONTAINING ALL REFLECTIVE OPTICS AND A PHOTOMULTIPLIER DETECTOR. THE DOUBLE MONOCHROMATOR WAS COMPOSED OF TWO FASTIE-EBERT-TYPE MONOCHROMATORS IN TANDEM. EACH MONOCHROMATOR HAD A 64- BY 64-MM GRATING WITH 2400 LINES PER MM. LIGHT FROM A 0.05-SR SOLID ANGLE (SUBTENDING APPROXIMATELY A 222-KM-SQUARE AREA ON THE EARTH'S SURFACE FROM A SATELLITE HEIGHT OF APPROXIMATELY 1100 KM) ENTERED THE NADIR-POINTING INSTRUMENT THROUGH A DEPOLARIZING FILTER. A MOTOR-DRIVEN CAM STEP ROTATED THE GRATINGS TO MONITOR THE INTENSITY OF 12 OZONE ABSORPTION WAVELENGTHS. THE DETECTOR WAS A PHOTOMULTIPLIER TUBE. FOR BACKGROUND READINGS, A FILTER PHOTOMETER MEASURED THE REFLECTED UV RADIATION IN AN OZONE-FREE ABSORPTION AREA NEAR 3000 A. SIGNALS FROM BOTH UNITS WERE READ BY SEPARATE RANGE-SWITCHING ELECTROMETERS WITH SEVEN RANGES. THE BUV EXPERIMENT CYCLE REQUIRED 6144 S. EACH CYCLE, IN TURN, WAS DIVIDED INTO 192 BUV FRAMES OF 32 S DURATION. CALIBRATION BY ONBOARD LIGHT SOURCES WAS PERFORMED IN 26 OF THE 192 FRAMES. THE OTHER FRAMES WERE USED FOR EXPERIMENTAL DATA. DURING EACH OF THESE DATA FRAMES, THE MONOCHROMATOR MEASURED THE INTENSITY OF THE UV RADIATION IN EACH OF THE 12 WAVELENGTH BANDS, WHILE THE PHOTOMETER MEASURED THE UV INTENSITY IN A SINGLE WAVELENGTH BAND. THE Dwell TIME AT EACH WAVELENGTH WAS 1.8 S, AND, DURING THIS INTERVAL, FOUR ANALOG UV INTENSITY MEASUREMENTS WERE TAKEN AT 400-MS INTERVALS IN ADDITION TO AN INTEGRATED PULSE COUNT MEASUREMENT OF THE UV INTENSITY AND ENERGETIC PARTICLE FLUX. ONCE EACH ORBIT, THE FIELD OF VIEW WAS CHANGED TO MONITOR THE SUN OR MOON DIRECTLY. THE MEASUREMENT RANGE OF THE SIGNAL CURRENT WAS FROM 0.2 TO 3000 MICROAMPS. THE VERTICAL DISTRIBUTION OF OZONE WAS OBTAINED BY MATHEMATICAL INVERSION TECHNIQUES. FOR A COMPLETE DESCRIPTION OF THE BUV EXPERIMENT, SEE SECTION 7 IN 'THE NIMBUS IV USER'S GUIDE.'

***** NIMBUS 5 *****

SPACECRAFT COMMON NAME- NIMBUS 5
ALTERNATE NAMES- NIMBUS-E, PL-721B
06305

NSSDC ID- 72-097A

LAUNCH DATE- 12/11/72 WEIGHT- 770. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/11/72
ORBIT PERIOD- 107.2 MIN INCLINATION- 99.9 DEG
PERIAPSIS- 1089. KM ALT APOAPSIS- 1101. KM ALT

PERSONNEL
MG - G.F. EISENWEIN NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - A.J. FLEIG NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 5 RESEARCH AND DEVELOPMENT SATELLITE WAS DESIGNED TO SERVE AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED METEOROLOGICAL SENSOR SYSTEMS AND COLLECTING METEOROLOGICAL AND GEOLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW, RING-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL SYSTEM HOUSING. THE SOLAR PADDLES AND CONTROL SYSTEM HOUSING WERE CONNECTED TO THE SENSOR MOUNT BY A TRUSS STRUCTURE, GIVING THE SATELLITE THE APPEARANCE OF AN OCEAN BUOY. NIMBUS 5 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE TORUS-SHAPED SENSOR MOUNT, WHICH FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL SYSTEM HOUSING, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES. PRIMARY EXPERIMENTS INCLUDED (1) A TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR) FOR MEASURING DAY AND NIGHT SURFACE AND CLOUDTOP TEMPERATURES, AS WELL AS THE WATER VAPOR CONTENT OF THE UPPER ATMOSPHERE, (2) AN ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) FOR MAPPING THE THERMAL RADIATION FROM THE EARTH'S SURFACE AND ATMOSPHERE, (3) AN INFRARED TEMPERATURE PROFILE RADIOMETER (ITPR) FOR OBTAINING VERTICAL PROFILES OF TEMPERATURE AND MOISTURE, (4) A MICROWAVE SPECTROMETER (NEMS) FOR DETERMINING TROPOSPHERIC TEMPERATURE PROFILES, ATMOSPHERIC WATER VAPOR ABUNDANCES, AND CLOUD LIQUID WATER CONTENTS, (5) A SELECTIVE CHOPPER RADIOMETER (SCR) FOR OBSERVING THE GLOBAL TEMPERATURE STRUCTURE OF THE

ATMOSPHERE, AND (6) A SURFACE COMPOSITION MAPPING RADIOMETER (SCMR) FOR MEASURING THE DIFFERENCES IN THE THERMAL EMISSION CHARACTERISTICS OF THE EARTH'S SURFACE.

***** NIMBUS 5, HOUGHTON *****

INVESTIGATION NAME- SELECTIVE CHOPPER RADIOMETER (SCR)

NSSDC ID- 72-097A-02

INVESTIGATIVE PROGRAM
CODE EBU/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON
OI - S.D. SMITH

OXFORD U
READING U

BRIEF DESCRIPTION

THE NIMBUS 5 SELECTIVE CHOPPER RADIOMETER (SCR) WAS DESIGNED TO (1) OBSERVE THE GLOBAL TEMPERATURE STRUCTURE OF THE ATMOSPHERE UP TO 50 KM IN ALTITUDE, (2) MAKE SUPPORTING OBSERVATIONS OF WATER VAPOR DISTRIBUTION, AND (3) DETERMINE THE DENSITY OF ICE PARTICLES IN CIRRUS CLOUDS. TO ACCOMPLISH THESE OBJECTIVES, THE SCR MEASURED EMITTED RADIATION IN 16 SPECTRAL INTERVALS SEPARATED INTO THE FOLLOWING FOUR GROUPS: (1) FOUR CO2 CHANNELS BETWEEN 13.8 AND 14.8 MICROMETERS (2) AN IR WINDOW CHANNEL AT 11.1 MICROMETERS AND A WATER VAPOR CHANNEL AT 18.6 MICROMETERS, (3) TWO CHANNELS AT 49.5 AND 153.3 MICROMETERS, AND (4) 2.08, 2.59, 2.65, AND 3.5 MICROMETERS. FROM AN AVERAGE SATELLITE ALTITUDE OF 1100 KM, THE RADIOMETER VIEWED A 48-KM CIRCLE ON THE EARTH'S SURFACE WITH A GROUND RESOLUTION OF ABOUT PLUS OR MINUS 1 DEG C. A SIMILAR EXPERIMENT WAS FLOWN ON NIMBUS 4.

***** NIMBUS 5, WILHEIT, JR. *****

INVESTIGATION NAME- ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)

NSSDC ID- 72-097A-04

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
OCEANOGRAPHY

PERSONNEL

PI - T.T. WILHEIT, JR.
OI - P. GLOENSEN

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THE NIMBUS 5 ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) WERE (1) TO DERIVE THE LIQUID WATER CONTENT OF CLOUDS FROM BRIGHTNESS TEMPERATURES OVER OCEANS, (2) TO OBSERVE DIFFERENCES BETWEEN SEA ICE AND THE OPEN SEA OVER THE POLAR CAPS, AND (3) TO TEST THE FEASIBILITY OF INFERRING SURFACE COMPOSITION AND SOIL MOISTURE. TO ACCOMPLISH THESE OBJECTIVES, THE ESMR WAS CAPABLE OF CONTINUOUS GLOBAL MAPPING OF THE 1.55-CM (19.36 GHZ) RADIO THERMAL (MICROWAVE) RADIATION EMITTED BY THE EARTH/ATMOSPHERE SYSTEM, AND COULD FUNCTION EVEN IN THE PRESENCE OF CLOUD CONDITIONS THAT BLOCK CONVENTIONAL SATELLITE INFRARED SENSORS. A 90- BY 90-CM RADIOMETER ANTENNA SYSTEM, DEPLOYED AFTER LAUNCH, SCANNED THE EARTH SUCCESSIVELY AT VARIOUS ANGLES IN A PLANE PERPENDICULAR TO THE SPACECRAFT ORBITAL TRACK, PRODUCING A BRIGHTNESS-TEMPERATURE MAP OF THE SURFACE OF THE EARTH AND ITS ATMOSPHERE. THE SCANNING PROCESS WAS CONTROLLED BY A COMPUTER ON BOARD, AND CONSISTED OF 78 SYMMETRICALLY-DISTRIBUTED INDEPENDENT SCAN SPOTS EXTENDING 50 DEG TO EITHER SIDE OF NADIR. ANGULAR SEPARATION OF THE SCAN SPOTS ALLOWED FOR AN 8.5 PERCENT OVERLAP BETWEEN VIEW POSITIONS. FROM A MEAN ORBITAL HEIGHT OF 1100 KM, THE RADIOMETER HAD AN ACCURACY OF ABOUT PLUS OR MINUS 1 DEG C WITH A SPATIAL RESOLUTION OF ABOUT 25 KM. THE ESMR DATA WERE STORED ON MAGNETIC TAPE FOR TRANSMISSION TO GROUND ACQUISITION STATIONS.

***** NIMBUS 6 *****

SPACECRAFT COMMON NAME- NIMBUS 6
ALTERNATE NAMES- PL-731B, NIMBUS-F
07924

NSSDC ID- 75-052A

LAUNCH DATE- 06/12/75 WEIGHT- 585. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/12/75
ORBIT PERIOD- 107.3 MIN INCLINATION- 100. DEG
PERIAPSIS- 1093. KM ALT APOAPSIS- 1101. KM ALT

PERSONNEL

MG - G.F. EISENWEIN
PM - C.N. MACKENZIE
PS - A.J. FLEIG

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 6 RESEARCH AND DEVELOPMENT SATELLITE SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR TESTING ADVANCED SYSTEMS FOR SENSING AND COLLECTING METEOROLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW TORUS-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL HOUSING UNIT CONNECTED TO THE SENSOR MOUNT BY A TRIPOD TRUSS STRUCTURE. CONFIGURED SOMEWHAT LIKE AN OCEAN BUOY, NIMBUS 6 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE SENSOR MOUNT THAT FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS SUPPORTED THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). THE NINE EXPERIMENTS SELECTED FOR NIMBUS 6 WERE (1) EARTH RADIATION BUDGET (ERB), (2) ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR), (3) HIGH-RESOLUTION INFRARED RADIATION SOUNDER (HIRS), (4) LIMB RADIANCE INVERSION RADIOMETER (LRIR), (5) PRESSURE MODULATED RADIOMETER (PMR), (6) SCANNING MICROWAVE SPECTROMETER (SCAMS), (7) TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR), (8) SATELLITE TRACKING AND DATA RELAY EXPERIMENT (T-DRE), AND (9) TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE). THIS COMPLEMENT OF ADVANCED SENSORS WAS CAPABLE OF (1) MAPPING TROPOSPHERIC TEMPERATURE, WATER VAPOR ABUNDANCE, AND CLOUD WATER CONTENT, (2) PROVIDING VERTICAL PROFILES OF TEMPERATURE, OZONE, AND WATER VAPOR, (3) TRANSMITTING REAL-TIME DATA TO A GEOSTATIONARY SPACECRAFT (ATS 6), AND (4) YIELDING DATA ON THE EARTH'S RADIATION BUDGET.

----- NIMBUS 6, HOUGHTON -----

INVESTIGATION NAME- PRESSURE MODULATED RADIOMETER (PMR)

NSSDC ID- 75-052A-09

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON
OI - C.D. RODGERS
OI - E.J. WILLIAMSON
OI - G.D. PESKETT
OI - P.L. CURTIS

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BRIEF DESCRIPTION

THE NIMBUS 6 PRESSURE MODULATED RADIOMETER (PMR) EXPERIMENT TOOK RADIO-METRIC MEASUREMENTS IN THE 15-MICROMETER CO₂ BAND AT ALTITUDES BETWEEN 45 AND 70 KM ON A GLOBAL SCALE. BY APPROPRIATE MATHEMATICAL RETRIEVAL METHODS, THE TEMPERATURE STRUCTURES OF THE UPPER STRATOSPHERE AND LOWER MESOSPHERE WERE THEN DEDUCED. THE PRESSURE-MODULATION TECHNIQUE PERMITTED THE EXTENSION OF SELECTIVE CHOPPING TECHNIQUES TO HIGHER ALTITUDES WHERE THE PRESSURE-BROADENED EMISSION LINES IN THE 15-MICROMETER CO₂ BAND BECAME SO NARROW THAT CONVENTIONAL SPECTROMETERS AND INTERFEROMETERS HAD INSUFFICIENT SPECTRAL RESOLUTION. IN ADDITION TO PRESSURE SCANNING (IN DISCRETE STEPS), THE RADIOMETER ALSO EMPLOYED DOPPLER SCANNING ALONG THE DIRECTION OF FLIGHT. THE PMR COMPRISED TWO SIMILAR RADIOMETER CHANNELS, EACH CONSISTING OF A PLANE SCANNING MIRROR, REFERENCE BLACKBODY, PRESSURE-MODULATOR CELL, AND DETECTOR ASSEMBLY. THE PLANE MIRROR WAS GOLD-COATED AND MOUNTED AT 45 DEG ON A 90-DEG STEPPING MOTOR SO THAT THE FIELD OF VIEW OF THE CHANNEL COULD BE DIRECTED TO SPACE OR TO THE INTERNAL REFERENCE BLACKBODY FOR INFLIGHT RANGE AND ZERO CALIBRATION. THE MOTOR WAS MOUNTED ON A PAIR OF FLEXIBLE PIVOTS SO THAT THE MIRROR COULD BE ROTATED THROUGH PLUS OR MINUS 7-1/2 DEG FROM ITS REST POSITION TO GIVE THE REQUIRED DOPPLER SCAN. MAJOR COMPONENTS IN THE PRESSURE-MODULATOR CELL WERE A MOVABLE PISTON, A DIAPHRAGM, AND A MAGNETIC DRIVE COIL. THE DETECTOR ASSEMBLY CONSISTED OF A FIELD LENS, A CONDENSING LIGHT PIPE, AND A PYROELECTRIC FLAKE BOLOMETER. EACH RADIOMETER HAD A FIELD OF VIEW THAT WAS 20 DEG WHOLE-ANGLE ACROSS THE SPACECRAFT'S LINE OF FLIGHT AND 40 DEG WHOLE-ANGLE PARALLEL TO THE LINE OF FLIGHT. THE REDUCED TEMPERATURE VALUES WERE WITHIN PLUS OR MINUS 2 DEG K AT 65 KM AND ABOUT PLUS OR MINUS 0.2 DEG K NEAR 50 KM.

----- NIMBUS 6, JACOBOWITZ -----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 75-052A-05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - N. JACOBOWITZ
OI - A.J. DRUMMOND (DECEASED)
OI - I. RUFF
OI - J.R. MICKEY
OI - W.J. SCHOLLES
OI - L.L. STONE

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EPPLBY LAB, INC
NOAA-MESS
EPPLBY LAB, INC
EPPLBY LAB, INC
NOAA-MESS

BRIEF DESCRIPTION

THE NIMBUS 6 EARTH RADIATION BUDGET (ERB) EXPERIMENT MEASURED REFLECTED AND EMITTED TERRESTRIAL RADIATION FLUXES IN CONJUNCTION WITH SOLAR RADIATION. THE RESULTS WERE USED (1) TO DETERMINE THE EARTH RADIATION BUDGET, (2) TO DETERMINE THE ANGULAR DISTRIBUTION OF TERRESTRIAL RADIATION FOR VARIOUS METEOROLOGICAL AND GEOGRAPHIC REGIMES, AND (3) TO CORRELATE MEASUREMENTS MADE USING IDENTICAL BUT INDEPENDENT CHANNELS CALIBRATED TO THE SAME STANDARD. INCOMING SOLAR RADIATION FROM 0.2 TO 50 MICROMETERS WAS NORMALLY MONITORED IN 10 SPECTRAL INTERVALS SEVERAL TIMES EACH DAY AND EVERY ORBIT DURING PERIODS OF SOLAR ACTIVITY. TERRESTRIAL RADIATION MEASUREMENTS WERE TAKEN CONTINUOUSLY IN THE 0.2 TO 4 MICROMETER, 0.7 TO 3 MICROMETER, AND 4 TO 50 MICROMETER INTERVALS. THE MEASUREMENTS WERE TAKEN IN TWO WAYS. FOUR CHANNELS, USING WIDE-ANGLE OPTICS (135.3-DEG FIELD OF VIEW), MEASURED THE TOTAL OUTGOING RADIATION INTEGRATED OVER THE ENTIRE DISK OF THE EARTH. THE SECOND SET OF MEASUREMENTS WAS OBTAINED FOR EIGHT HIGH-RESOLUTION SCANNING CHANNELS THAT MEASURED THE TERRESTRIAL RADIATION EMANATING FROM A RELATIVELY SMALL AREA OVER A RANGE OF VARIOUS ZENITH AND AZIMUTH ANGLES. THE MULTICHANNEL RADIOMETER EMPLOYED A BI-AXIAL SCANNING MECHANISM WHICH ENABLED MEASUREMENTS TO BE OBTAINED FROM THE FORWARD HORIZON TO THE AFT HORIZON IN A 64-S INTERVAL. EACH AXIS OF THE SCANNING MECHANISM CONTAINED FOUR SHORTWAVE CHANNELS (0.2 TO 4.0 MICROMETER) AND FOUR LONGWAVE CHANNELS (4.0 TO 50 MICROMETER) WITH A 0.25- BY 5.14-DEG FIELD OF VIEW. THE CHANNELS WERE ORIENTED IN A DIRECTIONAL FAN TO COVER 20 DEG TO EACH SIDE OF THE ORBITAL PLANE. THE 64-S SCAN PERIOD ALLOWED AN AREA TO BE MEASURED FROM UP TO 17 DIFFERENT ANGLES AS THE SPACECRAFT PASSED OVERHEAD.

----- NIMBUS 6, JULIAN -----

INVESTIGATION NAME- TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE)

NSSDC ID- 75-052A-01

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - P. JULIAN
OI - W.W. KELLOGG
OI - V.E. SUOMI
OI - C.R. LAUGHLIN
OI - R.L. TALLEY
OI - W.R. BANDEEN
OI - C.E. COTE

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NASA-GSFC
SIGMA DATA SERV CORP
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE GOALS OF THE NIMBUS 6 TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE) WERE CLOSELY ASSOCIATED WITH THE OBJECTIVES OF GARP AND INCLUDED (1) MEASURING UPPER ATMOSPHERIC WINDS OVER REMOTE REGIONS, (2) STUDYING THE RELATIVE AIR MOTION ALONG ISOBARIC SURFACES TO DETERMINE THE RATE OF CONVERSION OF ATMOSPHERIC POTENTIAL ENERGY INTO KINETIC ENERGY, AND (3) PROVIDING DIRECT MEASUREMENTS OF VARIOUS METEOROLOGICAL PARAMETERS THAT CAN SERVE AS REFERENCE POINTS IN ADJUSTING INDIRECT TEMPERATURE SOUNDINGS MADE FROM SATELLITES. THE EXPERIMENT CONSISTED OF TWO BASIC COMPONENTS: (1) APPROXIMATELY 300 CONSTANT-LEVEL METEOROLOGICAL BALLOONS TO YIELD MEASUREMENTS OF WINDS, TEMPERATURE, AND PRESSURE IN THE TROPICS AND AT SOUTHERN HEMISPHERE MIDLATITUDES AT 150 MB (ABOUT 13.6-KM ALTITUDE), AND (2) THE NIMBUS 6 RANDOM ACCESS MEASUREMENTS SYSTEM (RAMS) TO PROVIDE DATA COLLECTION AND LOCATION DETERMINATIONS FROM THE BALLOONS. THE 3.5-M-DIAM POLYESTER-HYLAR BALLOONS WERE EQUIPPED WITH A TRANSMITTER PACKAGE, SOLAR POWER SUPPLY, DIGITIZER/MODULATOR, AND SENSORS. THE SENSORS CONSISTED OF A RADIO ALTIMETER HAVING AN ACCURACY OF BETTER THAN PLUS OR MINUS 20 M, A BEAD THERMISTOR MONITORING THE AMBIENT AIR TEMPERATURE TO AN ACCURACY OF PLUS OR MINUS 0.5 DEG C, AND A PRESSURE SENSOR MEASURING THE 150-MB FLIGHT ALTITUDE TO AN ACCURACY OF PLUS OR MINUS 0.5 MB. A MAGNETIC CUTOFFDOWN DEVICE WAS ALSO INCLUDED ON EACH BALLOON TO ELIMINATE ANY ACCIDENTAL OVERFLIGHTS INTO REGIONS OF THE NORTHERN HEMISPHERE NORTH OF 20 DEG N LATITUDE. THE RAMS ON BOARD THE SPACECRAFT HAD NO COMMAND OR CONTROL CAPABILITY OVER THE BALLOONS (THE BALLOONS WERE NOT INTERROGATED). IT MERELY DETECTED EACH BALLOON SIGNAL (+01.2 MHZ) AND EXTRACTED THE CARRIER FREQUENCY, BALLOON IDENTIFICATION, AND SENSOR DATA. THIS INFORMATION, ALONG WITH TIME REFERENCES, WAS STORED IN DIGITAL FORM FOR SUBSEQUENT RELAY TO A GROUND ACQUISITION STATION. THE BALLOON'S POSITION AND VELOCITY WERE DERIVED FROM THE RELATIVE MOTION BETWEEN THE PLATFORM AND THE SATELLITE BY MEASURING DOPPLER SHIFTS IN THE CARRIER SIGNAL RECEIVED FROM THE BALLOON. TWERLE WAS CAPABLE OF A LOCATION ACCURACY OF 5 KM AND A PLATFORM VELOCITY ACCURACY OF 1 M/S.

----- NIMBUS 6, WILHEIT, JR.-----

INVESTIGATION NAME- ELECTRICALLY SCANNING MICROWAVE
RADIOMETER (ESMR)

NSSDC ID- 78-052A-03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY
OCEANOGRAPHY

PERSONNEL

PI - T.T. WILHEIT, JR.
OI - A.T. EDGERTON

NASA-GSFC
AEROJET ELECTROSYSTEMS

BRIEF DESCRIPTION

THE NIMBUS 6 ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) MEASURED THE EARTH'S MICROWAVE EMISSION AT 37 GHZ. THE LIQUID WATER CONTENT OF CLOUDS, THE DISTRIBUTION AND VARIATION OF SEA ICE COVER, AND GROSS CHARACTERISTICS OF LAND SURFACES (VEGETATION, SOIL MOISTURE, AND SNOW COVER) WERE OBTAINED FROM THESE MEASUREMENTS. THE DICKE-TYPE RADIOMETER CONSISTED OF A SINGLE TIME-SHARING RECEIVER AND AN ELECTRICALLY SCANNING PHASED ARRAY ANTENNA OPERATING AT 0.8 CM (37 GHZ). THE ANTENNA BEAM ARRAY, A 90- BY 20- BY 12-CM BOX-LIKE STRUCTURE, WAS MOUNTED ON TOP OF THE SPACECRAFT SENSORY RING AND WAS POINTED IN THE DIRECTION OF THE SPACECRAFT'S FORWARD MOTION AND TILTED DOWN 40 DEG FROM THE SATELLITE VELOCITY VECTOR. THE ANTENNA BEAM SCANNED THE EARTH IN 100 DISCRETE STEPS FOR VARIOUS ANGLES EXTENDING UP TO 35 DEG ON EITHER SIDE OF THE ORBITAL PLANE. THE DEDUCTED BRIGHTNESS TEMPERATURES WERE EXPECTED TO BE ACCURATE TO WITHIN 2 DEG K.

***** NIMBUS 7*****

SPACECRAFT COMMON NAME- NIMBUS 7
ALTERNATE NAMES- 11080, NIMBUS-G

NSSDC ID- 78-092A

LAUNCH DATE- 10/24/78 WEIGHT- 832. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GLOCENTRIC EPOCH DATE- 10/25/78
ORBIT PERIOD- 104.0 MIN INCLINATION- 99.3 DEG
PERIAPSIS- 938. KM ALT APOAPSIS- 953. KM ALT

PERSONNEL

MG - G.F. EISENWEIN
PM - C.M. MACKENZIE
PS - A.J. FLEIG

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 7 RESEARCH AND DEVELOPMENT SATELLITE SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED SYSTEMS FOR SENSING AND COLLECTING METEOROLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW TORUS-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL HOUSING UNIT THAT WAS CONNECTED TO THE SENSOR MOUNT BY A TRIPOD TRUSS STRUCTURE. CONFIGURED SOMEWHAT LIKE AN OCEAN BUOY, NIMBUS 7 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE SENSOR MOUNT THAT FORMED THE SATELLITE BASE HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). EIGHT EXPERIMENTS WERE SELECTED: (1) LIMB INFRARED MONITORING OF THE STRATOSPHERE (LIMS), (2) STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS), (3) COASTAL-ZONE COLOR SCANNER (CZCS), (4) STRATOSPHERIC AEROSOL MEASUREMENT II (SAMS II), (5) EARTH RADIATION BUDGET (ERR), (6) SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMWR), (7) SOLAR BACKSCATTER UV AND TOTAL OZONE MAPPING SPECTROMETER (SBUV/TOMS), AND (8) TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR). THESE SENSORS WERE CAPABLE OF OBSERVING SEVERAL PARAMETERS AT AND BELOW THE MESOSPHERIC LEVELS. A NEW CAPABILITY WAS DIRECTED TOWARD OBSERVATION OF ATMOSPHERIC AND OCEAN POLLUTANTS. SUFFICIENT RUNTIME WAS PLANNED FOR SEQUENTIAL MAPS (IMAGERY) OF THE PARAMETERS AVAILABLE FOR STUDY.

----- NIMBUS 7, GLOERSEN-----

INVESTIGATION NAME- SCANNING MULTISPECTRAL MICROWAVE
RADIOMETER (SMWR)

NSSDC ID- 78-098A-08

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
OCEANOGRAPHY

PERSONNEL

TL - P. GLOERSEN
TM - R.O. HANSEN
TM - D.W. STAEHLIN
TM - W.J. CAMPBELL
TM - D.B. ROSS
TM - P. GUDMANNSEN
TM - T.T. BARATH
TM - T.T. WILHEIT, JR.

NASA-GSFC
ENVIRONMENT CANADA
MASS INST OF TECH
US GEOLOGICAL SURVEY
NOAA-ERL
TECH U OF DENMARK
NASA-JPL
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMWR) WAS TO OBTAIN AND USE OCEAN MOMENTUM AND ENERGY-TRANSFER PARAMETERS ON A NEARLY ALL-WEATHER OPERATIONAL BASIS. WINDS, WATER VAPOR, LIQUID-WATER CONTENT, AND MEAN CLOUD DROPLET SIZE, ALL AT LOW ALTITUDES, WERE PARAMETERS WHICH WERE DERIVED. OCEAN ICE VS WATER WAS ALSO DETERMINED. MICROWAVE BRIGHTNESS TEMPERATURES WERE OBSERVED WITH A 10-CHANNEL (FIVE-FREQUENCY DUAL POLARIZED) SCANNING RADIOMETER OPERATING AT 0.8-, 1.4-, 1.7-, 2.8-, AND 4.6-CM WAVELENGTHS (37, 21, 18, 10.69, 6.633 GHZ). THE ANTENNA WAS A PARABOLIC REFLECTOR OFFSET FROM THE NADIR BY 0.73 RAD. MOTION OF THE ANTENNA REFLECTOR PROVIDED OBSERVATIONS FROM WITHIN A CONICAL VOLUME ALONG THE GROUND TRACK OF THE SPACECRAFT. THE SAME INSTRUMENT WAS ON SEASAT 1.

----- NIMBUS 7, HEATH-----

INVESTIGATION NAME- SOLAR BACKSCATTER ULTRAVIOLET/TOTAL
OZONE MAPPING SYSTEM (SBUV/TOMS)

NSSDC ID- 78-098A-09

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SOLAR PHYSICS

PERSONNEL

TL - D.F. HEATH
TM - C.L. MATEER
TM - A.D. BELMONT
TM - A.J. MILLER
TM - A.E.S. GREEN
TM - D.M. CUNNOLD
TM - W.L. IMHOFF
TM - A.J. KRUEGER

NASA-GSFC
ENVIRONMENT CANADA
CONTROL DATA CORP
NOAA-NMC
U OF FLORIDA
GEORGIA INST OF TECH
LOCKHEED PALO ALTO
NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE SBUV/TOMS WERE TO DETERMINE THE VERTICAL DISTRIBUTION OF OZONE, MAP THE TOTAL OZONE AND 200-MB HEIGHT FIELDS, AND MONITOR THE INCIDENT SOLAR ULTRAVIOLET (UV) IRRADIANCE AND ULTRAVIOLET RADIATION BACKSCATTERED FROM THE EARTH. THE SBUV SPECTROMETER MEASURED SOLAR UV BACKSCATTERED BY THE EARTH'S ATMOSPHERE AT 12 WAVELENGTHS BETWEEN 0.25 AND 0.33 MICROMETER (2500 AND 3300 Å), WITH A SPECTRAL HANDPASS OF .001 MICROMETER (10 Å). THE INSTRUMENT FOV OF 0.20 RAD WAS DIRECTED AT THE NADIR. A PARALLEL PHOTOMETER CHANNEL AT 0.34 MICROMETER (3400 Å) MEASURED THE REFLECTIVITY OF THE ATMOSPHERE'S LOWER BOUNDARY IN THE SAME 0.21-RAD FOV. BOTH CHANNELS ALSO VIEWED THE SUN FOR CALIBRATION THROUGH THE USE OF A DIFFUSER PLATE DEPLOYED NEAR THE TERMINATOR. THE CONTRIBUTION FUNCTIONS FOR THE EIGHT SHORTEST WAVELENGTHS WERE CENTERED AT LEVELS RANGING FROM 55 TO 28 KM AND WERE USED TO INFER THE VERTICAL OZONE PROFILE. THE FOUR LONGEST WAVELENGTHS HAD CONTRIBUTION FUNCTIONS IN THE TROPOSPHERE WHICH WERE USED TO COMPUTE THE TOTAL OZONE AMOUNT. THE SBUV SPECTROMETER HAD A SECOND MODE OF OPERATION THAT ALLOWED A CONTINUOUS SPECTRAL SCAN FROM 0.16 TO 0.4 MICROMETER (1600 TO 4000 Å) FOR DETAILED EXAMINATION OF THE EXTRATERRESTRIAL SOLAR SPECTRUM AND ITS TEMPORAL VARIATIONS. THE TOMS SYSTEMS, OPERATING IN PARALLEL WITH THE SBUV, STEP-SCANNED ACROSS A 105-DEG FOV NORMAL TO THE ORBITAL TRACK WITH AN FOV OF APPROXIMATELY 0.052 RAD. AT EACH SCAN POSITION, THE EARTH RADIANCE WAS MONITORED AT SIX WAVELENGTHS BETWEEN 0.31 AND 0.38 MICROMETER (3100 AND 3800 Å) TO INFER THE TOTAL OZONE AMOUNT. THE INSTRUMENT CONSISTED PRINCIPALLY OF THREE EBERT-FASTIE MONOCHROMETERS, TWO OF WHICH WERE OPERATED IN TANDEM FOR STRAY-LIGHT REJECTION. TOMS USED THE THIRD MONOCHROMETER, EQUIPPED WITH A SPATIAL SCAN MECHANISM AT THE ENTRANCE SLIT. THE SIGNAL-TO-NOISE RATIO OF THE SBUV WAS GREATER THAN 5.63. THE TOMS SIGNAL-TO-NOISE RATIO WAS GREATER THAN 1.45.

----- NIMBUS 7, HOUGHTON-----

INVESTIGATION NAME- STRATOSPHERIC AND MESOSPHERIC SOUNDER
(SAMS)

NSSDC ID- 78-098A-02

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
UPPER ATMOSPHERE RESEARCH

PERSONNEL
PI - J.T. HOUGHTON
OI - G.D. PESKETT
OI - C.D. RODGERS
OI - E.J. WILLIAMSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF SAMS WAS TO OBSERVE EMISSION FROM THE LIMB OF THE ATMOSPHERE THROUGH VARIOUS PRESSURE-MODULATOR RADIOMETERS, AND TO DETERMINE TEMPERATURE AND VERTICAL CONCENTRATIONS OF H_2O , N_2O , CH_4 , CO , AND NO IN THE STRATOSPHERE AND MESOSPHERE TO APPROXIMATELY 90 KM. MEASUREMENTS OF ZONAL WIND IN THIS REGION WERE ATTEMPTED BY OBSERVING THE DOPPLER SHIFT OF ATMOSPHERIC EMISSION LINES. RADIATION FROM THE LIMB OF THE ATMOSPHERE WAS INCIDENT ON A TELESCOPE OF 15-CM APERTURE. IN FRONT OF THE TELESCOPE, A PLANE MIRROR SCANNED THE LIMB, VIEWED SPACE FOR CALIBRATION, AND VIEWED THE ATMOSPHERE OBLIQUELY TO OBTAIN VERTICAL PROFILES. THREE ADJACENT FIELDS OF VIEW, EACH 28 BY 2.8 MRAD (CORRESPONDING TO 100 KM BY 10 KM AT THE LIMB), FOCUSED ONTO A FIELD-SPLITTING MIRROR WHICH DIRECTED RADIATION TO SIX DETECTORS. THE REMAINING DIVISION INTO CHANNELS WAS ACCOMPLISHED THROUGH DICHROIC BEAM SPLITTERS. THERE WERE SEVEN PRESSURE MODULATOR CELLS (PMC), TWO CONTAINING CO_2 , THE REMAINDER N_2O , NO , CH_4 , CO , H_2O . PRESSURE IN THE CELLS COULD BE VARIED ON COMMAND BY CHANGING THE TEMPERATURE OF A SMALL CONTAINER OF MOLECULAR SIEVE MATERIAL ATTACHED TO EACH PMC. THE SPECTRAL PARAMETERS FOR THE H_2O CHANNEL WERE 2.7 MICROMETERS AND 25 TO 100 MICROMETERS. ALL OTHER CHANNELS LAY WITHIN THE RANGE 4.1 TO 15 MICROMETERS. WITHIN THE TELESCOPE, A CHOPPER OPERATING AT 250 HZ ALLOWED MEASUREMENT OF TWO SEPARATE SIGNALS FROM ALL DETECTORS, ONE AT 250 HZ AND ONE AT THE PMC FREQUENCY. COMPARISON OF THESE SIGNALS PERMITTED ELIMINATING EMISSION FROM INTERFERING GASES WITHIN A PARTICULAR SPECTRAL INTERVAL. IN FRONT OF THE CHOPPER, A SMALL BLACK BODY AT KNOWN TEMPERATURE COULD BE INTRODUCED FOR CALIBRATION. ACCURATE MEASUREMENT OF THE ATMOSPHERIC PRESSURE AT THE LEVEL BEING VIEWED WAS OBTAINED FROM THE TWO SIGNALS FROM ONE CO_2 CHANNEL.

----- NIMBUS 7, HOVIS-----

INVESTIGATION NAME- COASTAL ZONE COLOR SCANNER (CZCS)

NSSDC ID- 78-098A-03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

TL - W.A. HOVIS
TM - H.L. RICHARD
TM - C.S. YENTSCH
TM - D. CLARK
TM - J.W. APEL
TM - S.Z. EL-SAYED
TM - H.R. GORDON
TM - R.C. WRIGLEY
TM - F.P. ANDERSON
TM - R. AUSTIN

NOAA-NESS
NASA-GSFC
BIGELOW LAB OCEAN SCI
NOAA-NESS
NOAA-PHEL
TEXAS A&M
NOAA-PHEL
NASA-ARC
NAUT RES INST OCEANOLOG
SCRIPPS INST OCEANOGR

BRIEF DESCRIPTION

THE COASTAL ZONE COLOR SCANNER EXPERIMENT WAS DESIGNED TO MAP CHLOROPHYLL CONCENTRATION IN WATER, SEDIMENT DISTRIBUTION, GELSTOFFE CONCENTRATIONS AS A SALINITY INDICATOR, AND TEMPERATURE OF COASTAL WATERS AND OCEAN CURRENTS. REFLECTED SOLAR ENERGY WAS MEASURED IN SIX CHANNELS TO SENSE COLOR CAUSED BY ABSORPTION DUE TO CHLOROPHYLL, SEDIMENTS, AND GELSTOFFE IN COASTAL WATERS. SPECTRAL BANDS AT 443 AND 670 NANOMETERS CENTER ON THE MOST INTENSE ABSORPTION BANDS OF CHLOROPHYLL, WHILE THE BAND AT 550 NANOMETERS CENTERS ON THE 'HINGE POINT,' THE WAVELENGTH OF MINIMUM ABSORPTION. RATIOS OF MEASURED ENERGIES IN THESE CHANNELS WERE SHOWN TO CLOSELY PARALLEL SURFACE CHLOROPHYLL CONCENTRATIONS. DATA FROM THE SCANNING RADIOMETER WERE PROCESSED, WITH ALGORITHMS DEVELOPED FROM THE FIELD EXPERIMENT DATA, TO PRODUCE MAPS OF CHLOROPHYLL ABSORPTION. THE TEMPERATURES OF COASTAL WATERS AND OCEAN CURRENTS WERE MEASURED IN A SPECTRAL BAND CENTERED AT 11.5 MICROMETERS. OBSERVATIONS WERE ALSO MADE IN TWO OTHER SPECTRAL BANDS, 520 NANOMETERS FOR CHLOROPHYLL CORRELATION AND 750 NANOMETERS FOR SURFACE VEGETATION. TO AVOID SUN GLINT, THE SCANNER MIRROR COULD BE TILTED ABOUT THE SENSOR PITCH AXIS ON COMMAND SO THAT THE LINE OF SIGHT OF THE SENSOR WAS MOVED PLUS OR MINUS 0.35 RAD IN STEPS OF 0.035 RAD WITH RESPECT TO THE NAIR.

----- NIMBUS 7, HUANG-----

INVESTIGATION NAME- TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)

NSSDC ID- 78-098A-10

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - P.H. HUANG
OI - L.J. ALLISON (RETIRED)

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE THIR EXPERIMENT OBJECTIVES WERE TO MEASURE THE INFRARED RADIATION FROM THE EARTH IN TWO SPECTRAL BANDS DURING BOTH DAY AND NIGHT PORTIONS OF THE ORBIT TO PROVIDE PICTURES OF THE CLOUD COVER, THREE-DIMENSIONAL MAPPINGS OF THE CLOUD COVER, AND TEMPERATURE MAPPINGS OF THE CLOUDS, LAND AND OCEAN SURFACES, CIRRUS CLOUD CONTENT, AND ATMOSPHERIC CONTAMINATION AND MOISTURE. THE NIMBUS 7 TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) DETECTED EMITTED THERMAL RADIATION IN BOTH THE 10.5- TO 12.5-MICROMETER REGION (IR WINDOW) AND THE 6.5- TO 7.0-MICROMETER REGION (WATER VAPOR). THE WINDOW CHANNEL MEASURED CLOUDTOP TEMPERATURES AND WAS CAPABLE OF PRODUCING HIGH-RESOLUTION PICTURES OF CLOUD COVER AND THERMAL GRADIENTS ON LAND AND WATER SURFACES IN CLOUD-FREE AREAS DURING BOTH THE DAY AND NIGHT PORTIONS OF THE ORBIT. THE OTHER CHANNEL OPERATED TO MAP THE WATER VAPOR DISTRIBUTION IN THE UPPER TROPOSPHERE AND STRATOSPHERE. DATA FROM THESE TWO CHANNELS WERE USED PRIMARILY TO SUPPORT OTHER, MORE SOPHISTICATED, METEOROLOGICAL EXPERIMENTS ONBOARD NIMBUS 7. THE INSTRUMENT CONSISTED OF A 12.7-CM CASSEGRAIN SYSTEM AND SCANNING MIRROR COMMON TO BOTH CHANNELS, A BEAM SPLITTER, FILTERS, AND TWO GERMANIUM-IMMERSED THERMISTOR BOLOMETERS. IN CONTRAST TO TV, NO IMAGE WAS FORMED WITHIN THE RADIOMETER. INCOMING RADIANT ENERGY WAS COLLECTED BY A FLAT SCANNING MIRROR INCLINED AT 45 DEG TO THE OPTICAL AXIS. THE MIRROR ROTATED THROUGH 360 DEG AT 48 RPM AND SCANNED IN A PLANE NORMAL TO THE SPACECRAFT VELOCITY. THE ENERGY THEN WAS FOCUSED ON A DICHROIC BEAM SPLITTER WHICH DIVIDED THE ENERGY SPECTRALLY AND SPATIALLY. THE TWO CHANNELS OF THIS SENSOR TRANSFORMED THE RECEIVED RADIATION INTO ELECTRIC OUTPUT (VOLTAGES), WHICH WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

----- NIMBUS 7, JACOBOWITZ-----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 78-098A-07

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

TL - H. JACOBOWITZ
TM - T.M. VONDERHAAR
TM - F.B. HOUSE
TM - K.L. COULSON
TM - J.R. HICKEY
TM - L.L. STONE
TM - A.P. INGERSOLL
TM - G.L. SMITH

NOAA-NESS
COLORADO STATE U
DREXEL U
U OF CALIF, DAVIS
EPPLBY LAB, INC
NOAA-NESS
CALIF INST OF TECH
NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EARTH RADIATION BUDGET (ERB) EXPERIMENT, A CONTINUATION OF NIMBUS 6 ERB, WAS TO DETERMINE, OVER A PERIOD OF A YEAR, THE EARTH RADIATION BUDGET ON BOTH SYNOPSIS AND PLANETARY SCALES BY SIMULTANEOUS MEASUREMENT OF INCOMING SOLAR RADIATION AND OUTGOING EARTH-REFLECTED (SHORTWAVE) AND EMITTED (LONGWAVE) RADIATION. BOTH FIXED WIDE-ANGLE SAMPLING OF TERRESTRIAL FLUXES AT THE SATELLITE ALTITUDE AND SCANNED NARROW-ANGLE SAMPLING OF THE RADIANCE COMPONENTS DEPENDENT ON ANGLE WERE USED TO DETERMINE OUTGOING RADIATION (REFLECTED AND EMITTED). THE ERB SUBSYSTEM CONSISTED OF A 22-CHANNEL RADIOMETER CONTAINING SEPARATE SUBASSEMBLIES TO PERFORM THE REQUIRED SOLAR, EARTH-FLUX (WIDE ANGLE), AND SCANNED EARTH RADIANCE NARROW ANGLE MEASUREMENTS. THE SYSTEMS USED OPTICAL FILTERS FOR SPECTRAL DISCRIMINATIONS, AS WELL AS UNCOOLED THERMAL DETECTORS, THERMOPILE DETECTORS IN THE SOLAR AND FIXED-EARTH-FLUX CHANNELS, AND PYROELECTRIC DETECTORS IN THE SCANNING CHANNELS. THE 10 SOLAR CHANNELS VIEWED IN FRONT OF THE OBSERVATORY IN THE X-Y PLANE. THE SOLAR CHANNELS OBTAINED USABLE SOLAR DATA ONLY DURING A PERIOD OF ABOUT 3 MIN IN EACH ORBIT WHEN THE SPACECRAFT WAS OVER THE ANTARCTIC REGION. THEIR FULL RESPONSE FIELD OF VIEW (FOV) WAS 0.18 RAD. THE SOLAR CHANNEL SUBASSEMBLY WAS PIVOTED PLUS OR MINUS 0.35 RAD IN THE X-Y PLANE TO COMPENSATE FOR SUN-ANGLE DEVIATION WHEN REQUIRED. THE FOUR EARTH-FLUX CHANNELS WERE MOUNTED SO THEY COULD CONTINUOUSLY VIEW THE TOTAL EARTH DISK, AND WERE CONTINUOUSLY SAMPLED AT FOUR PER S. DEMODULATOR OUTPUT SIGNALS WERE INTEGRATED FOR PERIODS OF AT LEAST 3.8 S. THERE WERE EIGHT NARROW FOV CHANNELS (FOUR SHORTWAVE AND FOUR LONGWAVE) MOUNTED IN THE SCANNING HEAD. THE HEAD WAS GIMBAL-MOUNTED IN THE RADIOMETER UNIT MAIN FRAME. THE FIELDS OF VIEW OF THE TELESCOPES WERE ASYMMETRIC (4.4 BY 89.4 MRAD) AND THOSE OF THE SHORTWAVE AND LONGWAVE CHANNELS WERE COINCIDENT. THE 89.4 MRAD FOV OF THE FOUR PAIR OF CHANNELS WERE NOT CONTIGUOUS, BUT COVERED ONLY ALTERNATE 89.4 MRAD ANGULAR INTERVALS ALONG THE HORIZON.

----- NIMBUS 7, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)

NSSDC ID- 78-098A-06

INVESTIGATIVE PROGRAM
CODE EDINVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

TL - M.P. MCCORMICK
TM - T.J. PEPIN
TM - G.W. GRAMS
TM - B.M. HERRMAN
TM - P.B. RUSSELLNASA-LARC
U OF WYOMING
GEORGIA INST OF TECH
U OF ARIZONA
SRI INTERNATIONAL

BRIEF DESCRIPTION

THE OBJECTIVE OF SAM-11 WAS TO MAP THE CONCENTRATION AND OPTICAL PROPERTIES OF STRATOSPHERIC AEROSOLS AS A FUNCTION OF ALTITUDE, LATITUDE, AND LONGITUDE. WHEN NO CLOUDS WERE PRESENT IN THE INSTRUMENT FIELD OF VIEW (IFOV), THE TROPOSPHERIC AEROSOLS COULD ALSO BE MAPPED. THE INSTRUMENT, BASICALLY A SUN PHOTOMETER, MEASURED THE EXTINCTION OF SOLAR RADIATION AT 1.0-MICROMETER WAVELENGTH DURING SPACECRAFT SUNRISE AND SUNSET. THE PHOTOMETER VIEWED A PORTION OF THE SOLAR DISK WITH A 0.145-MRAD IFOV AND A SAMPLING RATE OF 50 SAMPLES PER SECOND. AS THE SPACECRAFT FIRST VIEWED THE SUNRISE, THE PHOTOMETER-POINTING AXIS WAS DEPRESSED APPROXIMATELY 0.52 RAD WITH RESPECT TO THE SPACECRAFT HORIZONTAL. THE PHOTOMETER CONTINUED LOOKING AT THE SUN UNTIL ITS DEPRESSION ANGLE WAS ON THE ORDER OF 0.44 RAD (APPROXIMATELY 1.4 MIN OBSERVING TIME). BEFORE SUNSET, THE PHOTOMETER HEAD ROTATED 3.14 RAD IN AZIMUTH AND VIEWED THE SUN FROM A DEPRESSION OF APPROXIMATELY 0.44 TO 0.52 RAD AS THE SPACECRAFT ORBITED TO THE DARK SIDE OF THE EARTH. FOR THE EXPECTED HIGH NOON ORBIT, LATITUDES OF BETWEEN 1.12 AND 1.40 RAD IN BOTH HEMISPHERES WERE SCANNED FOR 3 MONTHS. THE EXTINCTION MEASUREMENTS WERE INVERTED FOR THE NUMBER DENSITY TIMES THE AEROSOL SCATTERING CROSS SECTION BY USING THE LAMBERT-BEER LAW AND ASSUMING THE ATMOSPHERE TO BE COMPOSED OF LAYERS. TO DETERMINE THE STRATOSPHERIC AEROSOL OPTICAL PROPERTIES, GROUND-TRUTH, IN SITU, BALLOON-BORNE AEROSOL MEASUREMENTS WERE ALSO MADE.

***** NOAA 6 *****

SPACECRAFT COMMON NAME- NOAA 6
ALTERNATE NAMES- NOAA-A, 11416

NSSDC ID- 79-057A

LAUNCH DATE- 06/27/79 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS FSPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESSINITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/28/79
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALTPERSONNEL
MG - R. ARNOLD NASA HEADQUARTERS
PM - J. FULLER, JR. NASA-GSFC

BRIEF DESCRIPTION

NOAA 6, A TIROS-N TYPE SPACECRAFT, WAS THE FIRST IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY-HIGH-RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER, AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURED THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSED AND RELAYED TO CENTRAL DATA-ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 50 SPACECRAFT BUS (BMSP-F1 OR 76-091A) DEVELOPED FOR THE U.S. AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

***** NOAA 6, NESS STAFF *****

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- 79-057A-01 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBSINVESTIGATION DISCIPLINE(S)
METEOROLOGYPERSONNEL
PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 6 ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA-SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURED EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.95 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR-WINDOW CHANNELS HAD A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA, HAD A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINED DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1-KM RESOLUTION. IDENTICAL EXPERIMENTS WERE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

***** NOAA 6, NESS STAFF *****

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- 79-057A-02 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBSINVESTIGATION DISCIPLINE(S)
METEOROLOGYPERSONNEL
PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 6 OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAD 14 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.8, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH WERE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN, WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDED SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

***** NOAA 6, NESS STAFF *****

INVESTIGATION NAME- DATA COLLECTION SYSTEM

NSSDC ID- 79-057A-03 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBSINVESTIGATION DISCIPLINE(S)
METEOROLOGYPERSONNEL
PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA 6 WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT CAME IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS WAS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, WILLIAMS-----
 INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR
 NSSDC ID- 79-057A-04 INVESTIGATIVE PROGRAM
 CODE ED/OPER ENVIRON MONITORING
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.J. WILLIAMS NOAA-ERL
 OI - R. SEALE NOAA-ERL
 OI - R.W. GRUBB NOAA-ERL
 OI - D.S. EVANS NOAA-ERL

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE 1705 SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE WERE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURED PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURED PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** NOAA 7*****

SPACECRAFT COMMON NAME- NOAA 7
 ALTERNATE NAMES- NOAA-C, 12553

NSSDC ID- 81-059A

LAUNCH DATE- 06/23/81 WEIGHT- 580.9 KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
 UNITED STATES NOAA-NESS
 UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/24/81
 ORBIT PERIOD- 102. MIN INCLINATION- 98.9 DEG
 PERIAPSIS- 845. KM ALT APOAPSIS- 863. KM ALT

PERSONNEL
 PI - R.J. ARNOLD NASA HEADQUARTERS
 PM - G.A. BRANCHFLOWER NASA-GSFC
 PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION
 NOAA 7 WAS THE SECOND (NOAA-6 FAILED AT LAUNCH) IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND SUPPORTED THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY-HIGH-RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURED THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCL), WHICH PROCESSED AND RELAYED TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA 7, NESS STAFF-----
 INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- 81-059A-01 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
 THE NOAA 7 ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURED EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR-WINDOW CHANNELS HAD A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME AND RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4-KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH-RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA (OF 4-KM RESOLUTION) AND LOCAL AREA COVERAGE (LAC) DATA FROM SELECTED PORTIONS OF EACH ORBIT (1-KM RESOLUTION). IDENTICAL EXPERIMENTS WILL BE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 7, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER
 NSSDC ID- 81-059A-02 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
 THE NOAA 7 OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAD 14 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7 MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3 MICROMETER CARBON DIOXIDE BAND, CHANNEL 3 - THE 9.7 MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1 MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15 MICROMETER CARBON DIOXIDE BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18 TO 30 MICROMETER ROTATIONAL WATER VAPOR BANDS (18.0, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 14.97 MICROMETERS THAT USED SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9), AND OBTAINED TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP SCAN THAT PROVIDED A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDED SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 7, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCL)
 NSSDC ID- 81-059A-03 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
 THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCL) ON NOAA 7 WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND SUPPORTED THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT CAME IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCL HAD FOR A MOVING SENSOR PLATFORM, A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 7, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- 81-059A-04

INVESTIGATIVE PROGRAM
CODE SB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - M.M. SAUER
OI - C.O. BOSTROM
OI - R.N. GRUND

NOAA-ERL
NOAA-ERL
APPLIED PHYSICS LAB
NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE 1708 SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/M AND 25 MEV/M. THERE WERE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURED PROTONS ABOVE 10, 30, AND 60 MEV; ELECTRONS ABOVE 140 KEV; AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEWED IN THE ANTI-EARTH DIRECTION, AND MEASURED PROTONS ABOVE 400 MEV, AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/M. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** DAO 3 *****

SPACECRAFT COMMON NAME- DAO 3

ALTERNATE NAMES- PL-7010, DAO-7
COPERNICUS, 06153

NSSDC ID- 72-065A

LAUNCH DATE- 08/21/72 WEIGHT- 2150. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.7 MIN
PERIAPSIS- 739. KM ALT

EPOCH DATE- 08/21/72
INCLINATION- 35.0 DEG
APOAPSIS- 751. KM ALT

PERSONNEL

MG - M.B. CHISHOLM
SC - E.J. WEILER
PM - J.P. CORRIGAN
PS - J.E. KUPPERIAN, JR.

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS MISSION WAS THE THIRD IN THE DAO PROGRAM AND ITS SECOND SUCCESSFUL SPACECRAFT TO OBSERVE THE CELESTIAL SPHERE FROM ABOVE THE EARTH'S ATMOSPHERE. A UV TELESCOPE WITH A SPECTROMETER MEASURED HIGH-RESOLUTION SPECTRA OF STARS, GALAXIES, AND PLANETS WITH THE MAIN EMPHASIS ON THE DETERMINATION OF INTERSTELLAR ABSORPTION LINES. THREE X-RAY TELESCOPES AND A COLLIMATED, PROPORTIONAL COUNTER PROVIDED MEASUREMENTS OF CELESTIAL X-RAY SOURCES. INTERSTELLAR ABSORPTION BETWEEN .1 AND 7 NM. THE DAO-3 SPACECRAFT WAS AN OCTAGONALLY SHAPED, ALUMINUM STRUCTURE WITH A 1.21-M HOLLOW, CENTRAL, TUBULAR AREA, WHICH HOUSED THE EXPERIMENT CONTAINER. SOLAR PANELS WERE MOUNTED ON EACH SIDE OF THE SPACECRAFT AT ANGLES OF 34 DEG AND HAD AN AREA OF 38.2 SQ M. A SUN DAPPLE PROTECTED THE EXPERIMENTS AND INCREASED THE LENGTH OF THE SPACECRAFT TO 4.9 M. TWO INERTIAL BALANCE BOOMS, ONE FORWARD AND ONE AFT, EXTENDED APPROXIMATELY 6.8 M. THE SPACECRAFT WAS EQUIPPED WITH AN INTERNAL REFERENCE UNIT (A HIGH-PRECISION, THREE-AXIS GYRO INERTIAL SYSTEM), SUN SENSORS, A MAGNETOMETER, AND STAR TRACKERS, WHICH ENABLED SPACECRAFT POINTING TO BE DETERMINED IN MANY DIFFERENT WAYS. A BORE-SIGHT STAR TRACKER, SENSITIVE TO SIXTH MAGNITUDE, CONTROLLED PITCH AND YAW TO WITHIN 5 ARC S. IN ADDITION, THE HIGH-RESOLUTION TELESCOPE EXPERIMENT HAD A FINE POINTING CONTROL, WHICH COULD CONTROL THE PITCH AND YAW TO WITHIN ONE TENTH ARC S ON BRIGHT STARS. SPACECRAFT ATTITUDE WAS CONTROLLED BY INERTIA WHEELS AND THRUSTERS. REDUNDANT TRACKING BEACONS FACILITATED GROUND TRACKING OF THE SPACECRAFT. TWO UHF (480.55 MHZ) TRANSMITTERS PROVIDED WIDEBAND TELEMETRY FOR TRANSMITTING DIGITAL DATA TO THE GROUND STATIONS. TWO REDUNDANT VHF (136.26 MHZ) TRANSMITTERS WERE USED IN A NARROW-BAND TELEMETRY LINK PRIMARILY FOR TRANSMITTING SPACECRAFT HOUSEKEEPING DATA, ALTHOUGH THEY SERVED AS BACKUPS FOR THE WIDEBAND TELEMETRY SYSTEM. TWO REDUNDANT PAIRS OF VHF COMMAND RECEIVERS WERE CARRIED AS PART OF A COMMAND SYSTEM CAPABLE OF STORING 1200 COMMANDS. DATA WERE STORED ON AN ON-BOARD TAPE RECORDER AND IN CORE STORAGE. AN ON-BOARD PROCESSOR MONITORED TELEMETRY DATA, ISSUED COMMANDS, AND WAS PROGRAMMED VIA THE COMMAND RECEIVER UPLINK. GUEST INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B

----- DAO 3, BOYD-----

INVESTIGATION NAME- STELLAR X RAYS

NSSDC ID- 72-065A-02

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
HIGH ENERGY ASTROPHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD
OI - P.W. SANFORD

U COLLEGE LONDON
U COLLEGE LONDON

BRIEF DESCRIPTION

THIS EXPERIMENT USED THREE REFLECTING MIRROR SYSTEMS AND A COLLIMATED PROPORTIONAL COUNTER TO OBSERVE CELESTIAL X-RAY SOURCES BETWEEN .1 AND 10 NM. BETWEEN .1 AND .3 NM THE COLLIMATED PROPORTIONAL COUNTER WAS USED IN CONJUNCTION WITH PULSE-SHAPE DISCRIMINATION TO REJECT BACKGROUND COUNTS. FROM .3 TO .9 NM AND .6 TO 1.0 NM, PROPORTIONAL COUNTERS LOCATED AT THE FOCUS OF TWO GRAZING-INCIDENCE REFLECTING TELESCOPES (8.9 SQ CM AND 12.5 SQ CM, RESPECTIVELY) WERE USED, WITH AN ANTICINCIDENCE SCINTILLATOR ALSO EMPLOYED TO REJECT BACKGROUND COSMIC-RAY COUNTS. AN OPEN-CHANNEL MULTIPLIER LOCATED AT THE FOCUS OF A GRAZING-INCIDENCE TELESCOPE (23 SQ CM) WAS USED TO OBSERVE BETWEEN 2 AND 10 NM. A SIX-CHANNEL PULSE HEIGHT ANALYZER COULD BE SWITCHED TO ANY OF THE THREE PROPORTIONAL COUNTERS TO IMPROVE THE ENERGY RESOLUTION. THE .3 TO .9 NM AND .6 - 1.0 NM SYSTEMS BECAME INOPERABLE IN JUNE 1973 WHEN THE BACKGROUND SHUTTER STUCK IN THE CLOSED POSITION. MOST OF THE OBSERVATION AFTER THIS TIMES WERE MADE WITH THE .1 - .3 NM SYSTEM.

----- DAO 3, SPITZER-----

INVESTIGATION NAME- HIGH-RESOLUTION TELESCOPES

NSSDC ID- 72-065A-01

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - L. SPITZER
OI - J. ROGERSON, JR.

PRINCETON U
PRINCETON U

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MAKE QUANTITATIVE OBSERVATIONS OF INTERSTELLAR ABSORPTION LINES IN THE SPECTRAL REGION 100 TO 350 NM. THE SECONDARY OBJECTIVE WAS TO OBSERVE UV SPECTRA OF SELECTED BRIGHTER STARS. THE PRIME OPTICAL SYSTEM WAS AN 80-CM-DIAM CASSEGRAIN TELESCOPE WITH A 16-M FOCAL LENGTH (F/20). THIS TELESCOPE WAS COUPLED TO A PASCHEN-RUNGE SPECTROMETER CAPABLE OF 0.1-A RESOLUTION IN FIRST ORDER AND 0.05-A RESOLUTION IN SECOND ORDER. THE PHOTONS WERE DETECTED BY FOUR EMR PHOTOTUBES, EACH EQUIPPED WITH ITS OWN EXIT SLIT, AND MOVABLE IN PAIRS ALONG THE ROWLAND CIRCLE. A GUIDANCE ERROR SENSOR ATTACHED TO THE PRIME OPTICS CONTROLLED THE SPACECRAFT ATTITUDE TO WITHIN 0.1 ARC S. THIS GUIDANCE SYSTEM LOCKED ONTO A STAR AS FAINT AS 7TH MAGNITUDE. THE OVERALL SYSTEM COULD MAKE USEFUL MEASUREMENTS ON O- AND B-TYPE STARS TO 7TH MAGNITUDE.

***** PIONEER *****

SPACECRAFT COMMON NAME- PIONEER 6

ALTERNATE NAMES- PIONEER-A, 01041

NSSDC ID- 65-105A

LAUNCH DATE- 12/16/65 WEIGHT- 146. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 311.1 DAYS
PERIAPSIS- 0.013 AU RAD

EPOCH DATE- 07/15/75
INCLINATION- 0.162 DEG
APOAPSIS- 0.965 AU RAD

PERSONNEL

MG - F.A. CARR
SC - A.G. OPP
PM - C.F. HALL
PS - P. DYAL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

PIONEER 6 WAS THE FIRST IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, SOLAR-CELL AND BATTERY-POWERED SATELLITES DESIGNED TO OBTAIN MEASUREMENTS ON A CONTINUING BASIS OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE. ITS EXPERIMENTS STUDIED THE POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, THE INTERPLANETARY ELECTRON DENSITY (RADIO PROPAGATION EXPERIMENT), SOLAR AND GALACTIC COSMIC RAYS, AND THE INTERPLANETARY MAGNETIC FIELD. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ANTENNA. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 60 RPM, AND THE SPIN AXIS WAS

PERPENDICULAR TO THE ECLIPTIC PLANE AND POINTED TOWARD THE SOUTH ECLIPTIC POLE. BY GROUND COMMAND, ONE OF FIVE BIT RATES, ONE OF FOUR DATA FORMATS, AND ONE OF FOUR OPERATING MODES COULD BE SELECTED. THE FIVE BIT RATES WERE 912, 256, 64, 16, AND 8 BPS. THREE OF THE FOUR DATA FORMATS CONTAINED PRIMARILY SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS FOR USE AT THE TWO HIGHEST BIT RATES. ANOTHER WAS FOR USE AT THE THREE LOWEST BIT RATES. THE THIRD CONTAINED DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT CONTAINED MAINLY ENGINEERING DATA. THE FOUR OPERATING MODES WERE REAL TIME, TELEMETRY STORE, DUTY CYCLE STORE, AND MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY-CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 BPS. THE TIME INTERVAL BETWEEN THE COLLECTION AND STORAGE OF SUCCESSIVE FRAMES COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS UP TO 19 H, AS LIMITED BY THE BIT STORAGE CAPACITY. IN THE MEMORY READOUT MODE, DATA WERE READ OUT AT WHATEVER BIT RATE WAS APPROPRIATE TO THE SATELLITE DISTANCE FROM THE EARTH.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 65-105A-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO USE THE TRACKING DATA FROM THE MISSION TO OBTAIN PRIMARY DETERMINATIONS OF THE MASS OF THE EARTH AND MOON, THE ASTRONOMICAL UNIT, AND THE OSCILLATING ELEMENTS OF THE ORBIT OF THE EARTH. THIS WAS APPROPRIATE BECAUSE OF THE ABSENCE OF MIDCOURSE ORBIT CORRECTIONS AND NEAR-PLANETARY ENCOUNTERS. ALSO, SOLAR RADIATION PRESSURE EFFECTS WERE SMALL. THE EXPERIMENT USED THE ONBOARD RECEIVER AND TRANSMITTER EQUIPMENT IN CONJUNCTION WITH DEEP SPACE NETWORK STATION EQUIPMENT TO OBTAIN DOPPLER MEASUREMENTS.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- RELATIVITY INVESTIGATION

NSSDC ID- 65-105A-10 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION

THE PIONEER 6 SPACECRAFT PRESENTED THE FIRST OPPORTUNITY TO INVESTIGATE THE RELATIVISTIC CONTRIBUTION OF THE SUN TO THE DOPPLER SHIFTING OF THE SPACECRAFT TRANSMITTER SIGNAL. THE DOPPLER TRANSDUCER SEGMENT OF THE SPACECRAFT TRANSMITTER WAS TO BE USED FOR THIS PURPOSE. HOWEVER, THE CORONAL NOISE PRODUCED A MUCH LARGER CONTRIBUTION TO THE TRANSMITTER SIGNAL THAN DID THE RELATIVISTIC DOPPLER EFFECT. THUS, ALTHOUGH THE EXPERIMENT FAILED IN ITS PRIMARY PURPOSE, IT DID CONTRIBUTE THE FIRST MEASURE OF THE RELATIVE EFFECT OF CORONAL NOISE ON DOPPLER SHIFTING OF RADIO SIGNALS.

----- PIONEER 6, BRIDGE-----

INVESTIGATION NAME- SOLAR WIND PLASMA FARADAY CUP

NSSDC ID- 65-105A-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - M.S. BRIDGE MASS INST OF TECH
OI - A.J. LAJARUS MASS INST OF TECH
OI - P. SCHERR U OF WISCONSIN

BRIEF DESCRIPTION

A MULTIGRID FARADAY CUP WITH TWO SEMICIRCULAR, COPLANAR COLLECTORS WAS USED TO STUDY SOLAR WIND IONS AND ELECTRONS. THE INSTRUMENT HAD 14 CONTIGUOUS, ENERGY-PER-CHARGE (E/Q) CHANNELS BETWEEN 75 AND 9380 V FOR POSITIVE IONS, AND FOUR ENERGY-PER-CHARGE CHANNELS BETWEEN 90 AND 1500 V FOR ELECTRONS. THE INSTRUMENT VIEW AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS AND PARALLEL TO THE ECLIPTIC PLANE. THE LINE SEPARATING THE TWO COLLECTORS LAY IN THE ECLIPTIC PLANE, ENABLING A ROUGH DETERMINATION OF SOLAR WIND BULK FLOW PERPENDICULAR TO THE ECLIPTIC PLANE. DURING EVERY SECOND SPACECRAFT ROTATION AND AT ONE VOLTAGE LEVEL, THE SUM OF THE CURRENTS FROM THE COLLECTORS WAS OBTAINED IN 28 CONTIGUOUS

11.25-DEG ANGULAR SECTORS (FROM -45 DEG TO 270 DEG, WITH 0 DEG BEING THE SPACECRAFT-SUN LINE). THE EIGHT MEASUREMENTS ABOUT THE SUN-EARTH LINE (-45 DEG TO +45 DEG) WERE TELEMETERED, BUT ONLY THE LARGEST MEASUREMENT IN EACH SUCCEEDING 45-DEG INTERVAL (45 DEG TO 270 DEG) WAS TELEMETERED. IN ADDITION, DURING THIS ROTATION, THE CURRENT FROM ONE OF THE COLLECTORS WAS MEASURED IN ALL TWENTY-EIGHT 11.25-DEG SECTORS, AND THE LARGEST WAS IDENTIFIED AND TELEMETERED (90TH MAGNITUDE AND SECTOR). A COMPLETE SET OF POSITIVE ION MEASUREMENTS AND ONE ENERGY CHANNEL OF ELECTRON MEASUREMENTS WERE COMPLETED EVERY 32 SEC. THE TIME BETWEEN EACH 32-S GROUP OF MEASUREMENTS VARIED WITH THE BIT RATE. FOR A MORE COMPLETE DESCRIPTION, SEE 'J. GEOPHYS. RES.' VOL 71, 3787-3791, AUGUST 1966.

----- PIONEER 6, FAN-----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 65-105A-03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - C.T. FAN U OF ARIZONA
OI - J.A. SIMPSON U OF CHICAGO
OI - J.E. LARPORT U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED A CHARGED-PARTICLE TELESCOPE COMPOSED OF FOUR SILICON SOLID-STATE DETECTORS TO STUDY THE ANISOTROPY AND FLUCTUATIONS OF SOLAR PROTONS AND ALPHA PARTICLES. THE PROTON ENERGY RANGES SAMPLED WERE 0.6 TO 13.9 MEV, 13.9 TO 73.2 MEV, 73.2 TO 175 MEV, AND 175 MEV. THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.4 TO 55.6 MEV, 55.6 TO 293 MEV, AND 293 MEV. THE TIME RESOLUTION RANGED FROM ABOUT ONE MEASUREMENT PER 0.6 S TO ABOUT ONE MEASUREMENT PER 28 S DEPENDING ON THE TELEMETRY BIT RATE. THE DETECTOR WAS MOUNTED SO THAT IT MADE A 360-DEG SCAN IN THE ECLIPTIC PLANE ABOUT ONCE PER SECOND. PULSE-HEIGHT ANALYSIS OF DETECTOR D1 OUTPUT (128 CHANNEL) AND D3 OUTPUT (32 CHANNEL) WAS ACCOMPLISHED FOR THE LAST EVENT PRIOR TO EACH TELEMETRY READOUT FOR THE EXPERIMENT. FOR FURTHER DETAILS, SEE FAN ET AL., JGR, 73, 1555, 1968.

----- PIONEER 6, GOLDSTEIN-----

INVESTIGATION NAME- SPECTRAL BROADENING

NSSDC ID- 65-105A-09 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
HIGH ENERGY ASTROPHYSICS
SOLAR PHYSICS

PERSONNEL

PI - R.H. GOLDSTEIN NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO EXPLORE THE STRUCTURE OF THE CORONA AND SOLAR EVENTS BY USING TELEMETRY SIGNALS AND THEIR SPECTRAL LINE BROADENING AS THEY PASSED THROUGH THE SOLAR CORONA AND APPROACHED THE SUN'S LIMB DURING SUPERIOR CONJUNCTION OCCULTATION. NORMALLY, THE SIGNALS CONSISTED OF VERY-NARROW-BAND (MONOCHROMATIC) AND SPECTRALLY PURE CARRIER WAVES, AND A SET OF MODULATION SIDE BANDS. THE CARRIER-WAVE FREQUENCY WAS NOMINALLY 2295 MHz AND THE SIDE BANDS WERE SEPARATED BY MULTIPLES OF 2 KHz AND WERE REMOVED BY FILTERING. DATA WERE COLLECTED IN THE FORM OF SPECTROGRAMS, EACH CONSISTING OF A 15-MIN OBSERVATION. THE THREE PARAMETERS OF INTEREST WERE THE SIGNAL POWER, CENTER FREQUENCY, AND BANDWIDTH. THE INSTRUMENTATION CONSISTED OF THE SPACECRAFT S-BAND TELEMETRY SYSTEM AND JPL'S 64-M RECEIVER ANTENNA, WHICH HAD A BEAMWIDTH OF ONLY 0.14 DEG AT 2300 MHz (S-BAND). IT WAS EXTREMELY SENSITIVE, HAVING AN EQUIVALENT NOISE TEMPERATURE OF ONLY 25 DEG K. THE RECEIVER WAS TUNED CONTINUOUSLY ACCORDING TO AN EPHEMERIS, WITH AN ACCURACY TO 0.05 MHz. THIS WAS NECESSARY IN ORDER TO COMPENSATE FOR FREQUENCY SHIFTS RESULTING FROM ORBITAL VELOCITIES OF THE SPACECRAFT AND EARTH'S SPIN. THE FREQUENCY BANDWIDTH WAS 100 MHz FOR EACH SPECTRUM, DEFINED BY A FILTER AT THE LAST STAGE OF THE RECEIVER. FREQUENCY RESOLUTION WAS 0.2 MHz OVER THE 100-MHz BANDWIDTH.

----- PIONEER 6, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 65-105A-05 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - R.G. MEERACKEN
OI - U.C. BARTLEY
OI - U.R. RAO
CSIRO
DOE HEADQUARTERS
ISRO SATELLITE CENTER

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED PRIMARILY TO MEASURE THE DIRECTIONAL CHARACTERISTICS OF GALACTIC AND SOLAR COSMIC-RAY FLUXES. THE PARTICLE DETECTOR WAS A (NaI (TL) SCINTILLATOR CRYSTAL THAT WAS SET INTO AN ANTICOINCIDENCE PLASTIC SCINTILLATOR COLLIMATOR CUP. SEPARATE PHOTOMULTIPLIER TUBES VIEWED THE TWO SCINTILLATIONS. PULSES FROM THE NaI CRYSTAL UNACCOMPANIED BY PULSES FROM THE PLASTIC SCINTILLATOR WERE SORTED BY A THREE-WINDOW PULSE-HEIGHT ANALYZER. THE WINDOWS CORRESPONDING TO ENERGY DEPOSITIONS OF 7.0 TO 44.0, 44.0 TO 77.1, AND 123.4 TO 303.8 MEV. COUNTS IN THE TWO LOWER ENERGY WINDOWS WERE DUE MAINLY TO PROTONS WITH THE WINDOW ENERGIES, WHILE ONLY PARTICLES OF 2 GREATER THAN OR EQUAL TO 2 CONTRIBUTED TO THE HIGHEST ENERGY WINDOW COUNT RATE. (PROTONS ABOVE 90 MEV GAVE ANTICOINCIDENCE PULSES.) FOR EACH ENERGY WINDOW, COUNTS WERE SEPARATELY ACCUMULATED IN EACH OF FOUR ANGULAR SECTIONS AS THE SPACECRAFT SPUN. EACH ANGULAR SECTION WAS NORMALLY 9.5 DEG IN WIDTH, WITH THE SUN IN THE MIDDLE OF ONE SECTOR. HOWEVER, WHEN LARGE FLUXES WERE ENCOUNTERED, EACH ANGULAR SECTION WAS REDUCED TO 11.2 DEG, WITH THE SUN NEAR THE MIDPOINT BETWEEN TWO SECTIONS. A SPIN-INTEGRATED (ISOTROPIC) MODE, IN WHICH ALL PARTICLES POSITIVELY 7.4 MEV IN THE NaI CRYSTAL (NO ANTICOINCIDENCE REQUIREMENT) WERE COUNTED, WAS ALSO USED. ACCUMULATION TIMES FOR EACH OF THE 12 DIRECTIONAL MODES AND FOR THE OMNIDIRECTIONAL MODE VARIED BETWEEN 14 S AND 112 S (SPACECRAFT SPIN PERIOD WAS ABOUT 1 S) DEPENDING ON THE TELEMETRY BIT RATE. SEE BARTLEY ET AL., 'REV. SCI. INSTRUM.', 38, 266, 1967, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 6, WOLFE -----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSDSC ID- 65-105A-06

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.M. WOLFE
NASA-ARC

BRIEF DESCRIPTION

A QUADRISPHERICAL ELECTROSTATIC ANALYZER WITH EIGHT CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 16 LOGARITHMICALLY EQUISPACED ENERGY-PER-CHARGE (E/Q) STEPS FROM 200 TO 10,000 V. THERE WAS AN ELECTRON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN EIGHT LOGARITHMICALLY EQUISPACED E/Q STEPS RANGING FROM 1 TO 500 V. THE EIGHT COLLECTORS MEASURED PARTICLES INCIDENT FROM EIGHT DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). THERE WERE FOUR 15-DEG INTERVALS, TWO 20-DEG INTERVALS, AND TWO 30-DEG INTERVALS. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 16 AZIMUTHAL ANGULAR SECTIONS. EIGHT OF THESE SECTIONS WERE 5-5/8 DEG WIDE, WERE CONTIGUOUS, AND BRACKETED THE SOLAR DIRECTION. THE REMAINING SEVEN SECTIONS WERE 45 DEG WIDE. THREE DIFFERENT MODES OF DATA COLLECTION WERE USED. AT THE HIGHEST BIT RATE (512 BPS), THE FULL SCAN MODE WAS ALTERNATED WITH THE MAXIMUM FLUX MODE AT EACH E/Q STEP. IN THE FULL SCAN MODE, THE MAXIMUM FLUX OBSERVED IN EACH OF THE 16 AZIMUTHAL SECTIONS AS THE SPACECRAFT ROTATED WAS RECORDED FOR A GIVEN SINGLE COLLECTOR AT A GIVEN E/Q STEP. DURING 24 SUCCESSIVE OPERATIONS OF THE FULL SCAN MODE (48 SPACECRAFT REVOLUTIONS), THE 16 ION E/Q STEPS AND EIGHT ELECTRON E/Q STEPS WERE EXERCISED FOR A GIVEN COLLECTOR. DURING EIGHT SUCCESSIVE SUCH PERIODS, EACH OF THE EIGHT COLLECTORS WAS EXERCISED. THE FULL CYCLE OF FULL SCAN MODE DATA REQUIRED 480 SPACECRAFT REVOLUTIONS (ABOUT 480 S). SUCH CYCLES WERE REPEATED WITHOUT INTERRUPTION AT THE HIGH BIT RATE. IN THE MAXIMUM FLUX MODE, FOR THE E/Q STEP USED IN THE PRECEDING REVOLUTION OF FULL SCAN MODE OPERATION, ALL COLLECTORS WERE OBSERVED FOR ONE REVOLUTION, AND THE MAXIMUM FLUX OBSERVED WAS REPORTED, ALONG WITH THE NUMBER OF THE COLLECTOR THAT OBSERVED IT AND THE ANGULAR DIRECTION (2-13/16-DEG RESOLUTION) OF THE OBSERVATION. AT THE NEXT HIGHEST BIT RATE (256 BPS), THE SHORT-SCAN MODE WAS ALTERNATED EVERY SPACECRAFT REVOLUTION WITH THE MAXIMUM-FLUX MODE. THE SHORT-SCAN MODE WAS THE SAME AS THE FULL-SCAN MODE, EXCEPT THAT ONLY THE PEAK FLUX IN EACH OF THE EIGHT 5-5/8-DEG-WIDE AZIMUTHAL SECTIONS WAS RECORDED. THUS, THIS CYCLE ALSO TOOK 480 SPACECRAFT REVOLUTIONS. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE ALONE WAS USED. THUS, NO AZIMUTHAL DISTRIBUTIONS WERE MEASURED. AT THE LOW BIT RATES, IT TOOK 32 S FOR A COMPLETE SET OF ION MEASUREMENTS AND 16 S FOR A COMPLETE SET OF ELECTRON MEASUREMENTS. AT 64 BPS, THE ION AND ELECTRON MEASUREMENTS WERE TAKEN AND TELEMETRED EVERY 84 S. AT 16 BPS, THEY WERE TAKEN AND TELEMETRED EVERY 336 S. AT 8 BPS, THEY WERE TAKEN AND TELEMETRED EVERY 672 S.

----- PIONEER 9 -----

SPACECRAFT COMMON NAME- PIONEER 9
ALTERNATE NAMES- PIONEER-9, PL-68A4
83533

NSDSC ID- 68-100A

LAUNCH DATE- 11/08/68
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA
HEIGHT- 147. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES
NASA-OSD

ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 297.6 DAYS
PERIAPSIS- 0.754 AU AAE

EPOCH DATE- 02/27/76
INCLINATION- 0.006 DEG
APOAPSIS- 0.990 AU AAE

PERSONNEL
MG - F.A. CARR
SC - A.G. OPP
PR - C.F. HALL
PS - P. DYAL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

PIONEER 9 WAS THE FOURTH IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, AND SOLAR-CELL AND BATTERY-POWERED SATELLITES DESIGNED TO OBTAIN MEASUREMENTS OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE ON A CONTINUING BASIS. THE SPACECRAFT CARRIED EXPERIMENTS TO STUDY THE POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, THE INTERPLANETARY ELECTRON DENSITY (RADIO PROPAGATION EXPERIMENT), SOLAR AND GALACTIC COSMIC RAYS, THE INTERPLANETARY MAGNETIC FIELD, COSMIC DUST, AND ELECTRIC FIELDS. ALSO, A NEW CODING PROCESS WAS IMPLEMENTED FOR PIONEER 9. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ONE. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 60 RPM, AND THE SPIN AXIS WAS PERPENDICULAR TO THE ECLIPTIC PLANE AND POINTED TOWARD THE SOUTH ECLIPTIC POLE. BY GROUND COMMAND, ONE OF FIVE BIT RATES, ONE OF FOUR DATA FORMATS, AND ONE OF FOUR OPERATING MODES COULD BE SELECTED. THE FIVE BIT RATES WERE 512, 256, 64, 16, AND 8 BPS. THREE OF THE FOUR DATA FORMATS CONTAINED PRIMARILY SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS USED AT THE TWO HIGHEST BIT RATES. ANOTHER WAS USED AT THE THREE LOWEST BIT RATES, AND THE THIRD CONTAINED DATA FROM ONLY THE RADIO-PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT CONTAINED MAINLY ENGINEERING DATA. THE FOUR OPERATING MODES WERE REAL-TIME, TELEMETRY-STORE, DUTY-CYCLE STORE, AND MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY-STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY-CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 BPS. THE TIME PERIOD BETWEEN COLLECTION AND STORAGE OF SUCCESSIVE FRAMES COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS OF UP TO 10 H, AS LIMITED BY THE BIT-STORAGE CAPACITY. IN THE MEMORY READOUT MODE, DATA WERE READ OUT AT WHATEVER BIT RATE WAS APPROPRIATE TO THE SATELLITE DISTANCE FROM THE EARTH.

----- PIONEER 9, ANDERSON -----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSDSC ID- 68-100A-08

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON
NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE (1) TO OBTAIN PRIMARY DETERMINATIONS OF THE MASSES OF THE EARTH AND MOON AND THE DISTANCE BETWEEN THE EARTH AND SUN (AU), (2) TO USE THE TRACKING DATA FROM THE WHOLE SERIES OF PIONEER PROBES IN A PROGRAM DESIGNED TO IMPROVE THE EPHEMERIS OF THE EARTH, AND (3) TO INVESTIGATE THE POSSIBILITY OF A TEST OF GENERAL RELATIVISTIC MECHANICS USING THE PIONEER ORBITS AND DATA. THE INSTRUMENTATION WAS A TWO-WAY S-BAND DOPPLER TRACKING MECHANISM, USING HIGH-GAIN ANTENNAS WITH DISK-LIKE PATTERNS IN A PLANE PERPENDICULAR TO THE SPIN AXIS OF THE SPACECRAFT. WHEN THE SPIN AXIS WAS PERPENDICULAR TO THE ECLIPTIC, RADIO SIGNALS FROM THE ANTENNA CONTINUOUSLY ILLUMINATED THE EARTH. DATA WERE TRANSMITTED CONTINUOUSLY AND WERE RECEIVED AT GROUND-BASED DEEP SPACE NETWORK STATIONS WITH 24.5-M DIAMETER ANTENNAS, AND AT THE 64-M ANTENNA IN CALIFORNIA.

----- PIONEER 9, BERG -----

INVESTIGATION NAME- COSMIC DUST DETECTOR

NSDSC ID- 68-100A-04

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL
PI - O.E. SERG(RTIRED)

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED (1) TO MEASURE THE COSMIC-DUST FLUX DENSITY IN THE SOLAR SYSTEM, (2) TO DETERMINE THE DISTRIBUTION OF COSMIC-DUST CONCENTRATIONS IN THE EARTH'S ORBIT, (3) TO DETERMINE THE GRADIENT, FLUX DENSITY, AND SPEED OF PARTICLES IN METEOR STRAFS, AND (4) TO PERFORM AN IN-FLIGHT CONTROL EXPERIMENT ON THE RELIABILITY OF THE MICROPHONE AS A COSMIC-DUST SENSOR. THE EXPERIMENT INSTRUMENTATION WAS IDENTICAL TO THAT CARRIED ON PIONEER 8, CONSISTING ESSENTIALLY OF TWO THIN-FILM-GRID DETECTORS (SEPARATE BY A DISTANCE OF 5 CM) THAT PRODUCED AN ELECTRICAL SIGNAL WHEN THE FILM WAS PENETRATED BY A MICROMETEOROID. EACH FILM HAD A SENSITIVE AREA OF 100 SQ CM AND WAS COMPOSED OF 16 SEGMENTS THAT PROVIDED BOTH THE DIRECTION AND THE TIME OF FLIGHT NEEDED FOR THE METEOROID TO TRAVERSE THE 5-CM DISTANCE BETWEEN THE FRONT-FILM AND THE REAR-FILM SENSOR. THE COMBINED RESULTS OF THE PIONEER 8 AND 9 COSMIC-DUST EXPERIMENTS LENT STRONG SUPPORT TO THE HYPOTHESIS THAT THE BULK OF METEOROID DUST IS OF COMETARY ORIGIN.

----- PIONEER 9, ESHLEMAN-----

INVESTIGATION NAME- TWO-FREQUENCY BEACON RECEIVER

NSSDC ID- 68-100A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - V.R. ESHLEMAN
OI - T.A. CROFT
OI - H.T. HOWARD
OI - R.L. LEADARRAND
OI - R.A. LONG
OI - A.M. PETERSON

STANFORD U
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STANFORD U
SRI INTERNATIONAL
SRI INTERNATIONAL
STANFORD U

BRIEF DESCRIPTION

BOTH 423.3-MHZ AND ITS 2/17 SUBHARMONIC 49.8-MHZ SIGNALS WERE TRANSMITTED FROM A 4.6-M STEERABLE PARABOLIC ANTENNA AT STANFORD UNIVERSITY TO THE TWO-FREQUENCY RADIO RECEIVER ON THE SPACECRAFT. THE HIGH-FREQUENCY SIGNAL SERVED AS A REFERENCE SIGNAL, SINCE ITS PROPAGATION TIME WAS NOT APPRECIABLY DELAYED. THE LOW-FREQUENCY SIGNAL WAS DELAYED IN PROPORTION TO THE TOTAL ELECTRON CONTENT IN THE PROPAGATION PATH. ON THE SPACECRAFT, A PHASE-LOCKED RECEIVER COUNTED THE BEAT FREQUENCY ZERO CROSSINGS OF THE RECEIVED SIGNALS TO OBTAIN MEASUREMENTS OF PHASE-PATH DIFFERENCES. DIFFERENTIAL DELAY OF THE GROUP VELOCITY WAS ALSO OBSERVED, AND THESE VALUES WERE TELEMETERED TO THE GROUND STATION AND USED TO CALCULATE THE TOTAL ELECTRON CONTENT. THE IONOSPHERIC CONTRIBUTION (UP TO A SELECTED ALTITUDE OBTAINED FROM OTHER EXPERIMENTAL TECHNIQUES) COULD BE SUBTRACTED TO PRODUCE DATA DESCRIBING THE INTERPLANETARY ELECTRON CONTENT OF THE SOLAR WIND AND ITS VARIATIONS. MORE DETAILED DESCRIPTIONS OF THE EXPERIMENT CAN BE FOUND IN J. GEOPHYS. RES., 71, 3325-3327, AND IN RADIO SCIENCE, 6, 55-63.

----- PIONEER 9, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 68-100A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.C. MCCracken
OI - U.R. RAD
OI - W.C. BARTLEY

CSIRO
ISRO SATELLITE CENTER
DOE HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A CSI SCINTILLATOR AND THREE SOLID-STATE TELESCOPES. THE CSI SCINTILLATOR WAS COLLIMATED BY AN ANTICOINCIDENCE PLASTIC SCINTILLATOR AND HAD A CONICAL APERTURE WITH A 38.2-DEG HALF-ANGLE. THE SCINTILLATOR LOOK DIRECTION WAS CENTERED IN THE ECLIPTIC PLANE. THREE SOLID-STATE DETECTORS WERE ORIENTED IN A FAN ARRANGEMENT WITH RESPECT TO A FOURTH SOLID-STATE DETECTOR, SUCH THAT EACH OF THE FIRST THREE DETECTORS FORMED A TELESCOPE WITH THE FOURTH DETECTOR. EACH OF THE THREE TELESCOPES THUS FORMED HAD AN ACCEPTANCE CONE OF 23-DEG HALF-ANGLE. THE MEAN VIEWING DIRECTIONS OF THE TELESCOPES WERE IN THE ECLIPTIC PLANE AND 48 DEG ABOVE AND BELOW THAT PLANE, RESPECTIVELY. TWO CONCURRENT MODES OF COUNTING WERE EMPLOYED. IN THE FIRST MODE, COUNTS WERE ACCUMULATED IN EIGHT SEPARATE 45-DEG INTERVALS DURING THE SPACECRAFT SPIN, WHILE, IN THE SECOND, SPIN-INTEGRATED COUNTS WERE ACQUIRED. IN THE FIRST MODE, THE SCINTILLATOR SEPARATELY MEASURED PARTICLES WITH ENERGIES IN THE RANGES 7.4 TO 21.5 MEV/NUCLEON AND 19.7 TO 63.0 MEV/NUCLEON (NO SPECIES DISCRIMINATION) WHILE EACH SOLID-STATE TELESCOPE SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 3.3 TO 3.6 MEV AND 3.6 TO 6.7 MEV. IN THE SECOND MODE, THE SCINTILLATOR SEPARATELY MEASURED PARTICLES IN SIX CONTIGUOUS ENERGY INTERVALS BETWEEN 4.5 AND 40 MEV/NUCLEON (INTERVAL LOWER LIMITS AT 4.5, 7.0, 9.6, 13, 21, AND 26 MEV/NUCLEON), WHILE EACH OF THE SOLID-STATE TELESCOPES SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 1 TO 8, 1 TO 5, 1 TO 3, AND 4 TO 6 MEV, AND ALPHA PARTICLES IN

THE ENERGY RANGE 4 TO 8 MEV. DURING EACH 224-LIT MAIN TELEMETRY FRAME, TWO FIRST-MODE 9-BIT ACCUMULATORS AND ONE SECOND-MODE 9-BIT ACCUMULATOR WERE READ OUT. IN-FLIGHT CALIBRATION OF THE SCINTILLATOR AND OF SOME OF THE ELECTRONICS WAS PERFORMED DAILY. SEE BUKATA ET AL, 'IEEE TRANS. NUC. SCI.,' NS-17, 15-24, 1970, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 9, SCARF-----

INVESTIGATION NAME- PLASMA WAVE DETECTOR

NSSDC ID- 68-100A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF
OI - I.M. GREEN
OI - G.W. CROOK
OI - R.W. FREDERICKS

TRW SYSTEMS GROUP
TRW SYSTEMS GROUP
GAINES M. CROOK ASSOC
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

ELECTROSTATIC AND ELECTROMAGNETIC PLASMA WAVES WERE MEASURED IN THE SOLAR WIND NEAR 1 AU USING AN UNBALANCED ELECTRIC DIPOLE ANTENNA. THE 423-MHZ STANFORD UNIVERSITY ANTENNA, WHICH SERVED AS THE SENSOR, WAS CAPACITIVELY COUPLED TO THREE TELEMETRY CHANNELS. CHANNEL 1 WAS A 15-PERCENT BANDPASS FILTER CENTERED AT 400 HZ, AND CHANNEL 2 WAS A 15-PERCENT BANDPASS FILTER CENTERED AT 30 KHZ. THESE CHANNELS WERE EACH SAMPLED 64 TIMES PER TELEMETRY SEQUENCE. CHANNEL 3 WAS A BROADBAND 100-HZ TO 100-KHZ CHANNEL. THE BROADBAND CHANNEL WAS FED INTO A COUNT-RATE METER THAT MEASURED THE NUMBER OF POSITIVE-GOING PULSES PER UNIT TIME HAVING AMPLITUDES LARGE ENOUGH TO CROSS THE PRESENT TRIGGER LEVEL. THE TRIGGER LEVEL WAS VARIED THROUGH EIGHT STEPS, EIGHT TIMES PER TELEMETRY SEQUENCE. THE TRIGGER LEVELS, TOGETHER WITH THE COUNT RATE AT EACH LEVEL, GAVE A MEASURE OF THE BROADBAND POWER SPECTRUM. DUE TO AMBIENT CONDITIONS, THESE DATA USUALLY REPRESENTED THE POWER AT ABOUT 100 HZ. THE TELEMETRY SEQUENCE WAS REPEATED OVER TIME INTERVALS FROM 7 MIN 28 S TO 472 MIN 52 S.

----- PIONEER 9, SONETT-----

INVESTIGATION NAME- TRIAXIAL MAGNETOMETER

NSSDC ID- 68-100A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.P. SONETT
OI - D.S. COLBURN

U OF ARIZONA
NASA-ARC

BRIEF DESCRIPTION

A BOOM-MOUNTED, TRIAXIAL FLUXGATE MAGNETOMETER WAS USED TO STUDY THE INTERPLANETARY MAGNETIC FIELD AND ITS FLUCTUATIONS. THE SENSORS WERE ORTHOGONALLY MOUNTED WITH ONE AXIS PARALLEL TO THE SPACECRAFT SPIN AXIS. UPON COMMAND, A MOTOR INTERCHANGED A SENSOR IN THE SPIN PLANE WITH THE SENSOR ALONG THE SPIN AXIS, ENABLING IN-FLIGHT DETERMINATION OF ZERO LEVELS. EVERY 24 HOURS, THE INSTRUMENT WAS COMMANDED INTO A SELF-CALIBRATE SEQUENCE, AND THIS WAS OFTEN REPEATED AFTER THE SENSORS WERE FLIPPED. THE INSTRUMENT, WHICH HAD A DYNAMIC RANGE OF PLUS OR MINUS 200 NT WITH A RESOLUTION OF PLUS OR MINUS 0.2 NT, WAS CAPABLE OF INFLIGHT DEMODULATION OF THE SIGNALS RECEIVED FROM THE TWO SENSORS IN THE SPIN PLANE. EACH MAGNETIC FIELD COMPONENT WAS DIGITIZED INTO A 10-BIT TELEMETRY WORD. NINE MAGNETIC FIELD COMPONENTS, COMPRISING THREE MAGNETIC FIELD VECTORS, WERE TRANSMITTED IN EACH SPACECRAFT TELEMETRY FRAME.

----- PIONEER 9, WEBBER-----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 68-100A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - W.R. WEBBER

U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED A TELESCOPE COMPRISED OF FIVE SOLID-STATE SENSORS, A CERENKOV DETECTOR, AND AN ANTICOINCIDENCE SHIELD. THE TELESCOPE AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. AS DETERMINED BY TWO COINCIDENCE MODES AND ELECTRONIC DISCRIMINATION OF SENSOR OUTPUT PULSES, PARTICLES MEASURED WERE (1) ELECTRONS IN THREE CONTIGUOUS ENERGY INTERVALS BETWEEN 0.31 AND 5.1 MEV, (2) PROTONS IN FIVE CONTIGUOUS ENERGY INTERVALS BETWEEN 2.2 AND 42 MEV, AND (3) ALPHA PARTICLES IN CONTIGUOUS ENERGY INTERVALS BETWEEN 5.8 AND 42 MEV/NUCLEON. A THIRD COINCIDENCE MODE MEASURED THE SUM OF COUNTS DUE TO ELECTRONS ABOVE 0.6 MEV AND NUCLEI ABOVE 14 MEV/NUCLEON. A FOURTH COINCIDENCE MODE MEASURED THE SUM OF NUCLEI ABOVE 42 MEV/NUCLEON AND ELECTRONS ABOVE 5.1 MEV. SPACECRAFT SPIN-INTEGRATED DIRECTIONAL FLUXES WERE MEASURED IN

THE VARIOUS MODES. ACCUMULATION TIMES AND READOUT INTERVALS WERE DEPENDENT ON THE TELEMETRY BIT RATE AND WERE TYPICALLY IN TENS OF S. IN ALL CASES, THEY WERE LONGER THAN THE SPACECRAFT SPIN PERIOD.

----- PIONEER 9, WOLFE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 68-100A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
SPACE PLASMA
PARTICLES AND FIELDS

PERSONNEL

PI - J.M. WOLFE
OI - D.O. MCKIRBIN

NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

A TRUNCATED HEMISPHERICAL ELECTROSTATIC ANALYZER (120-DEG TOTAL PARALLEL-PLATE CURVATURE) WITH THREE CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF THE ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 30 LOGARITHMICALLY EQUISPACED ENERGY PER UNIT CHARGE (E/Q) STEPS FROM 150 TO 15,000 V. THERE WAS AN ELECT ON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN 14 LOGARITHMICALLY EQUISPACED E/Q STEPS RANGING FROM 12 TO 1000 V. THERE WAS ALSO A ZERO E/Q, OR BACKGROUND, STEP. THE THREE COLLECTORS MEASURED PARTICLES INCIDENT FROM THREE DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). TWO COLLECTORS MEASURED FLUX FROM 10 TO 85 DEG ON EITHER SIDE OF THE SPACECRAFT EQUATORIAL PLANE, AND THE THIRD MEASURED FLUX IN A 20-DEG INTERVAL CENTERED ON THE SPACECRAFT EQUATORIAL PLANE. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 23 POSSIBLE 2-13/16-DEG-WIDE AZIMUTHAL ANGULAR SECTIONS. SEVENTEEN OF THESE SECTIONS WERE CONTIGUOUS AND UNGATED THE SOLAR DIRECTION. THE REMAINING SIX SECTIONS WERE WIDELY SPACED. THE INSTRUMENT HAD THREE MODES OF DATA COLLECTION: POLAR SCAN, AZIMUTHAL SCAN, AND MAXIMUM FLUX. AT THE TWO HIGHEST BIT RATES (512 AND 256 BPS), THE POLAR-SCAN MODE WAS ALTERNATED WITH THE AZIMUTHAL SCAN MODE AT EACH E/Q STEP. IN THE POLAR-SCAN MODE, ALL THREE COLLECTORS WERE OBSERVED, AND THE PEAK FLUX OBTAINED AND THE AZIMUTHAL DIRECTION (TO 2-13/16 DEG) OF THE OBSERVATION WERE REPORTED FOR EACH COLLECTION. IN THE AZIMUTHAL SCAN MODE, THE PEAK FLUX OBSERVED IN THE 23 AZIMUTHAL SECTIONS WAS RECORDED FOR THE CENTRAL COLLECTOR AT EACH E/Q STEP. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE WAS USED AT EACH E/Q STEP FOLLOWED BY EITHER (1) FOR IONS, A POLAR SCAN AND AN AZIMUTHAL SCAN AT THAT E/Q STEP WHERE THE PEAK FLUX MEASUREMENT DURING THE MAXIMUM FLUX MODE WAS OBTAINED, OR (2) FOR ELECTRONS, A POLAR SCAN AND AN AZIMUTHAL SCAN AT E/Q = 100 V. IN THE MAXIMUM FLUX MODE, ONLY THE CENTRAL COLLECTOR WAS OBSERVED, AND THE PEAK FLUX OBTAINED AND THE AZIMUTHAL DIRECTION (TO 2-13/16 DEG) OF THE OBSERVATION WERE REPORTED. A COMPLETE SET OF MEASUREMENTS CONSISTED OF SEVEN SETS OF 10V MEASUREMENTS (AT EACH E/Q STEP) AND ONE SET OF ELECTRON MEASUREMENTS (AT EACH E/Q STEP). AT THE HIGH BIT RATES (512 AND 256 BPS) ONE SET OF ION MEASUREMENTS TOOK 62 S AND ONE SET OF ELECTRON MEASUREMENTS, 38 S. AT THE LOW BIT RATES (64, 16, AND 8 BPS), ONE SET OF ION MEASUREMENTS TOOK 37 S AND ONE SET OF ELECTRON MEASUREMENTS, 28 S. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETERED EVERY 402.5 S. AT 16 BPS, IT TOOK 1610 S, AND, AT 8 BPS, IT TOOK 3220 S.

***** PIONEER 10*****

SPACECRAFT COMMON NAME- PIONEER 10
ALTERNATE NAMES- PIONEER-10, PL-7230
05860

NSSDC ID- 72-012A

LAUNCH DATE- 03/03/72 WEIGHT- 2511 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-US

INITIAL ORBIT PARAMETERS
ORBIT TYPE- JUPITER FLYBY

PERSONNEL

MG - F.A. CARR
SC - A.J. OPP
PM - C.F. MALL
PS - M. DVAL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

THIS MISSION WAS THE FIRST TO BE SENT TO THE OUTER SOLAR SYSTEM, AND AFTER ENCOUNTERING THE PLANET JUPITER IT ASSURED AN ESCAPE TRAJECTORY FROM THE SOLAR SYSTEM. THE SPACECRAFT BODY WAS MOUNTED BEHIND A 2.74-M-DIAMETER PARABOLIC DISH ANTENNA THAT WAS 46 CM DEEP. THE SPACECRAFT STRUCTURE WAS A 36-CM-DEEP FLAT EQUIPMENT COMPARTMENT, THE TOP AND BOTTOM BEING REGULAR HEXAGONS. ITS SIDES WERE 71 CM LONG. ONE SIDE JOINED A SMALLER COMPARTMENT THAT CARRIED THE SCIENTIFIC EXPERIMENTS. THE HIGH-GAIN ANTENNA FEED WAS SITUATED ON THREE STRUTS, WHICH PROJECTED FORWARD ABOUT 1.2 M. THIS FEED WAS TOPPED WITH A

MEDIUM-GAIN ANTENNA. A LOW-GAIN OMNIDIRECTIONAL ANTENNA EXTENDED ABOUT 0.76 M BEHIND THE EQUIPMENT COMPARTMENT AND WAS MOUNTED BELOW THE HIGH-GAIN ANTENNA. POWER FOR THE SPACECRAFT WAS OBTAINED BY FOUR SNAP-19 RADIOISOTOPE THERMIONIC GENERATORS (RTG), WHICH WERE HELD ABOUT 3 M FROM THE CENTER OF THE SPACECRAFT BY TWO THREE-ROD TRUSSES 120 DEG APART. A THIRD ROD EXTENDED 6.6 M FROM THE EQUIPMENT COMPARTMENT TO HOLD THE MAGNETOMETER AWAY FROM THE SPACECRAFT. THE FOUR RTG'S GENERATED ABOUT 155 WATTS AT LAUNCH AND DECAYED TO APPROXIMATELY 140 WATTS BY THE TIME THE SPACECRAFT REACHED JUPITER, 21 MONTHS AFTER LAUNCH IN DECEMBER 1973. THERE WERE THREE REFERENCE SENSORS: A STAR SENSOR FOR CANOPUS, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTIONS TO THE EARTH AND THE SUN, WITH THE KNOWN DIRECTION TO CANOPUS AS A BACKUP. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN-RATE CONTROL (MAINTAINED AT 0.6 RPM) AND CHANGED THE VELOCITY OF THE SPACECRAFT. THESE THRUSTERS COULD BE PULSED OR FIRED STEADILY BY COMMAND. COMMUNICATIONS WERE MAINTAINED VIA THE OMNIDIRECTIONAL AND MEDIUM-GAIN ANTENNAS, WHICH OPERATED TOGETHER, CONNECTED TO ONE RECEIVER, WHILE THE HIGH-GAIN ANTENNA WAS CONNECTED TO ANOTHER RECEIVER. THESE RECEIVERS COULD BE INTERCHANGED BY COMMAND TO PROVIDE SOME REDUNDANCY. TWO RADIO TRANSMITTERS, COUPLED TO TWO TRAVELING-WAVE TUBE AMPLIFIERS, PRODUCED 8 WATTS AT 2292 MHZ EACH. UPLINK WAS ACCOMPLISHED AT 2110 MHZ, WHILE DATA TRANSMISSION DOWNLINK WAS AT 2292 MHZ. THE DATA WERE RECEIVED BY NASA'S DEEP SPACE NETWORK. THE SPACECRAFT WAS TEMPERATURE-CONTROLLED BETWEEN MINUS 25 DEG C AND PLUS 34 DEG C. FIFTEEN EXPERIMENTS WERE CARRIED TO STUDY THE INTERPLANETARY AND PLANETARY MAGNETIC FIELDS; SOLAR WIND PARAMETERS; COSMIC RAYS; TRANSITION REGION OF THE HELIOSPHERE; NEUTRAL HYDROGEN ABUNDANCE; DISTRIBUTION, SIZE, MASS, FLUX, AND VELOCITY OF DUST PARTICLES; JOVIAN AURORAE; JOVIAN RADIO WAVES; ATMOSPHERE OF JUPITER AND SOME OF ITS SATELLITES, PARTICULARLY IO; AND TO PHOTOGRAPH JUPITER AND ITS SATELLITES. INSTRUMENTS CARRIED FOR THESE EXPERIMENTS WERE MAGNETOMETER, PLASMA ANALYZER, CHARGED PARTICLE DETECTOR, IONIZING DETECTOR, NON-IMAGING TELESCOPES WITH OVERLAPPING FIELDS OF VIEW TO DETECT SUNLIGHT REFLECTED FROM PASSING METEORIODS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING THE PENETRATION OF METEORIODS, PHOTOMETER, IN KAPTONETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AND MEASURED POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM THE TRACKING AND OCCULTATION DATA. THE SPACECRAFT ACHIEVED ITS CLOSEST APPROACH ON DECEMBER 5, 1973, WHEN IT REACHED APPROXIMATELY THREE JOVIAN RADII (ABOUT 210,000 KM). THE SPACECRAFT CONTAINS PLAQUES THAT HAVE DRAWINGS DEPICTING A MAN, A WOMAN, AND THE LOCATION OF THE SUN AND THE EARTH IN OUR GALAXY.

----- PIONEER 10, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 72-012A-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETOLOGY
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON
OI - G.W. NOLL

NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

TWO-WAY DOPPLER TRACKING OF THE SPACECRAFT WAS USED TO MAKE MORE PRECISE DETERMINATIONS OF PLANETARY MASSES, THE HELIOCENTRIC ORBIT OF JUPITER, AND THE GRAVITATIONAL FIELDS OF THE SUN, JUPITER, AND THE GALILEAN SATELLITES.

----- PIONEER 10, FILLIUS-----

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 72-012A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.W. FILLIUS
OI - C.E. MCLWAIN

U OF CALIF, SAN DIEGO
U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN ARRAY OF FIVE PARTICLE DETECTORS WITH ELECTRON THRESHOLDS IN THE RANGE .01 TO 35 MEV AND PROTON THRESHOLDS IN THE RANGE 0.15 TO 80 MEV. A CERNKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND C4) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 6.4, 9.4, 15, AND 1 MEV, RESPECTIVELY. AN ELECTRON-SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A MINIMUM IONIZATION COUNTER (M) HAD THREE OUTPUT CHANNELS, M1 SENSITIVE TO ELECTRONS HAVING ENERGIES GREATER THAN 35 MEV, M2 THAT MEASURED BACKGROUND, AND M3 THAT WAS SENSITIVE TO PROTONS HAVING ENERGIES GREATER THAN 80 MEV. THE LAST TWO SENSORS WERE SCINTILLATION DETECTORS (SP AND SE), BOTH OF WHICH HAD ENERGY THRESHOLDS OF 10 KEV FOR ELECTRONS AND 150 KEV FOR PROTONS. THE SENSITIVITY OF THE SE DETECTOR TO PROTONS WAS ABOUT A FACTOR OF 10 LOWER THAN ITS SENSITIVITY TO ELECTRONS. THUS, THE SE1 CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM

THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS, LISTED ABOVE, REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THREE OF THE CHANNELS (CDC, SPDC, AND SEDC) WERE READ OUT THROUGH A COMMON ELECTROMETER. DUE TO A MALFUNCTION THAT OCCURRED BETWEEN LAUNCH AND JOVIAN ENCOUNTER, THESE THREE CHANNELS PRODUCED NO USABLE ENCOUNTER DATA. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READOUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 108 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULAR TO THE SPIN AXIS AND THE SPIN RATE WAS 5 RPM, PITCH-ANGLE MEASUREMENTS WERE OBTAINED. WHILE THE EXPERIMENT WAS PRIMARILY DESIGNATED FOR ENCOUNTER STUDIES, SOME DATA WERE OBTAINED AT LOW RATES IN INTERPLANETARY SPACE. A DESCRIPTION OF THE INSTRUMENTATION AND INITIAL RESULTS WAS PUBLISHED IN JGR, 79, 3589, 1974.

----- PIONEER 10, GEHRELS-----

INVESTIGATION NAME- IMAGING PHOTOPOLARIMETER (IPP)

NSSDC ID- 72-012A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - T. GEHRELS	U OF ARIZONA
OI - D.L. COFFEN	NASA-GISS
OI - J. NAMEEN-ANTILA	U OF ARIZONA
OI - C.E. KENKNIGHT	U OF ARIZONA
OI - N.F. HUMMER	SANTA BARBARA RES CTR
OI - M.G. TOMASKO	U OF ARIZONA
OI - W. SWINDELL	U OF ARIZONA

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT WAS USED DURING JOVIAN ENCOUNTER TO MAKE SIMULTANEOUS TWO-COLOR (BLUE - 4000 TO 4900 Å, RED - 5600 TO 7000 Å) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE-RESOLUTION (ABOUT 200 KM AT 45°) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES. THE POLARIMETRIC AND RADIOMETRIC WORK WAS PERFORMED USING AN R-X 8-MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5-M BY 0.5-MRAD APERTURE STOP. RELATIVE RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN LAMP. LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSER/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE; I.E., PRIMARY RADIOMETRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE BACKLIT (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS: (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKESUTOV CATADIOPTRIC TELESCOPE (F/3.4), (2) A FOCAL PLANE WHEEL CONTAINING FIELD-OF-VIEW APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTED WAVELENGTHS SHORTER THAN 5500 Å (BLUE BEAM) AND TRANSMITTED ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) FOR EACH SPECTRAL BEAM (TWO POLARIZATIONS), A FILTERING COATED RELAY LENS AND FOLDING MIRRORS, AND (6) FOR EACH SPECTRAL BEAM, TWO BENDIX CHANNELTRON DETECTORS (BLUE BIALKALI S-11 PHOTOCATHODES AND RED S-20 PHOTOCATHODES) TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 10, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 72-012A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.L. JUDGE	U OF SOUTHERN CALIF
OI - R.W. CARLSON	NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, CONSISTING OF A BROADBAND PHOTOMETER SENSITIVE BETWEEN .02 AND .08 MICROMETERS (200 AND 800 Å), OBSERVED EVIDENCE OF HELIUM, WHICH IN TURN INDICATED INTERACTIONS BETWEEN CHARGED PARTICLES AND NEUTRAL HYDROGEN. DURING THE CRUISE PHASE OF THE MISSION, THIS EXPERIMENT WAS USED TO SEARCH FOR THE SUPERSONIC-TO-SUBSONIC TRANSITION REGION IN THE SOLAR WIND. DURING THE JOVIAN ENCOUNTER, THIS EXPERIMENT WAS USED TO LOOK FOR EVIDENCE OF AN AURORAL OVAL ON THE JOVIAN DAYSIDE, TO FIND THE RATIO OF HYDROGEN TO HELIUM IN THE JOVIAN ATMOSPHERE, AND TO FIND THE TEMPERATURE OF THE OUTER PORTION OF THE JOVIAN ATMOSPHERE.

----- PIONEER 10, KINARD-----

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 72-012A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY DUST

PERSONNEL

PI - W.H. KINARD	NASA-LARC
OI - R.E. TURNER	NASA-MSFC
OI - J.M. ALVAREZ	NASA-LARC
OI - D.H. HUMES	NASA-LARC
OI - R.L. O'NEAL	NASA-LARC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE NUMBER OF METEOROID IMPACTS ON THE PIONEER 10 SPACECRAFT BY MEANS OF 12 PANELS, EACH CONTAINING 18 PRESSURIZED CELLS, MOUNTED ON THE BACK OF THE ANTENNA DISK. THE TOTAL EXPOSED AREA WAS 0.965 SQ M. EACH PANEL OF GAS-FILLED CELLS CONSISTED OF A 2.54E-5 M (1-MIL) THICK AND A 5.08E-5 M (2-MIL) THICK SHEET OF STAINLESS STEEL WELDED TOGETHER IN SUCH A WAY THAT MANY SMALL POCKETS OF GAS WERE LEFT BETWEEN THEM. WHENEVER A POCKET WAS PUNCTURED, THE GAS ESCAPED AND A COLD CATHODE DEVICE DETECTED THE LOSS. THE RATE OF PRESSURE LOSS INDICATED THE SIZE OF THE HOLE MADE, AND THUS THE PARTICLE'S MASS AND INCIDENT ENERGY COULD BE DETERMINED. THE COMBINATION OF THESE DATA WITH TRAJECTORY DATA PROVIDED AN INDICATION OF THE SPATIAL DENSITY OF THE PARTICLES. THE 2.54E-5 M THICK SIDE OF THE GAS PANEL WAS EXPOSED TO THE INTERPLANETARY MEDIUM, AND PENETRATIONS OF THE CELLS FROM THAT SIDE INDICATED ENCOUNTERS WITH PARTICLES HAVING MASSES OF 1 NANOGRAM OR MORE. SOME 300 TO 400 HITS WERE EXPECTED BY THE TIME THE SPACECRAFT COMPLETED ITS 200-DAY JOURNEY THROUGH THE ASTEROID BELT.

----- PIONEER 10, KLIORE-----

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 72-012A-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. KLIORE	NASA-JPL
OI - G. FJELDRO	NASA-JPL
OI - D.L. CAIN	NASA-JPL
OI - M.L. SEIDEL	NASA-JPL
OI - S.L. RASOOL	NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHZ, 8 W) SPACECRAFT RADIO TRANSMITTER SIGNAL CHARACTERISTICS TO OBTAIN INFORMATION ABOUT THE IONOSPHERES AND ATMOSPHERES OF JUPITER AND ITS SATELLITE IO. ENTRANCE INTO AND EXIT FROM JUPITER AND IO OCCULTATION, PROVIDED CHANGES IN THE SIGNAL CHARACTERISTICS FROM WHICH ATMOSPHERIC TEMPERATURE, PRESSURE, AND ELECTRON DENSITY PROFILES COULD BE CALCULATED. TEMPERATURE AND PRESSURE PROFILES WERE LIMITED TO LEVELS ABOVE THE PRESSURE OF ONE EARTH ATMOSPHERE. SIGNAL OCCULTATION ALSO PROVIDED A DETERMINATION OF THE PLANETARY DIAMETER.

----- PIONEER 10, McDONALD-----

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 72-012A-12

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - F.B. McDONALD	NASA-GSFC
OI - K.G. MCCracken	CSIRO
OI - W.N. WENNER	U OF NEW HAMPSHIRE
OI - E.L. ROELOF	APPLIED PHYSICS LAB
OI - J.H. THAINOR	NASA-GSFC
OI - R.J. TEEGARDEN	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE MULTI-ELEMENT SOLID-STATE TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. THE HIGH-ENERGY TELESCOPE (HET) CONSISTED OF FIVE COLLINEAR SENSORS, AND MEASURED STOPPING PARTICLES (Z = 1 TO 8) IN THE ENERGY RANGE 20 TO 50 MEV/NUCLEON; AND PENETRATING PARTICLES IN THE RANGE 50 TO 800 MEV/NUCLEON. CHARGE RESOLUTION FOR PENETRATING PARTICLES WAS POSSIBLE UP TO 200 MEV/NUCLEON. THE FIRST LOW-ENERGY TELESCOPE (LET-I) HAD FOUR ELEMENTS AND MEASURED STOPPING (Z = 1 TO 8) PARTICLES IN THE ENERGY RANGE 3 TO 32 MEV/NUCLEON. THE SECOND LOW-ENERGY TELESCOPE (LET-II) HAD THREE ELEMENTS AND MEASURED STOPPING ELECTRONS BETWEEN 50 AND 1000 KEV AND STOPPING PROTONS BETWEEN 50 KEV AND 20 MEV. FOR EACH TELESCOPE, COUNT RATES WERE OBTAINED FOR EACH OF SEVERAL SENSOR COINCIDENCE-ANTICOINCIDENCE MODES. SOME OF THE DATA FROM EACH TELESCOPE WERE SECTORED INTO EIGHT OCTANTS IN THE

SPACECRAFT SPIN PLANE. IN ADDITION, THREE-SENSOR PULSE-HEIGHT ANALYSIS, WITH PRIORITY SCHEMES FAVORING THE ANALYSIS OF HEAVIER PARTICLES, WAS ASSOCIATED WITH EACH TELESCOPE.

----- PIONEER 10, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 72-012A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON	U OF CHICAGO
OI - J.J. O'GALLAGHER	U OF MARYLAND
OI - A. TUZZOLINO	U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED CHARGED-PARTICLE COMPOSITION AND SPECTRA USING FOUR DETECTOR SYSTEMS: (1) THE MAIN TELESCOPE, CONSISTING OF SEVEN ELEMENTS AND PROVIDING ENERGY SPECTRA (APPROXIMATELY 3 TO 68 MEV FOR PROTONS AND 10 TO 150 MEV/N FOR OXYGEN), ELEMENT RESOLUTION (THROUGH OXYGEN), AND ISOTOPE RESOLUTION (FOR H AND HE); (2) THE LOW-ENERGY SUBSYSTEM TELESCOPE, CONSISTING OF TWO ELEMENTS AND USING A VERY SMALL THIN FIRST ELEMENT TO EXTEND THE HIGH-SENSITIVITY PROTON MEASUREMENTS BELOW 1 MEV (0.3 TO 9 MEV) IN THE PRESENCE OF A HIGH GAMMA-RAY BACKGROUND ABOARD THE SPACECRAFT; (3) THE ELECTRON-CURRENT DETECTOR (OR EGG), CONSISTING OF A BERYLLIUM-SHIELD SILICON DETECTOR OPERATED IN CURRENT MODE TO MEASURE HIGH FLUXES OF ELECTRONS WITH ENERGIES ABOVE 3 MEV; AND (4) THE FISSION CELL DETECTOR, RECORDING FISSION FRAGMENTS FROM THE NUCLEON-INDUCED FISSION OF THORIUM 232 SANDWICHED BETWEEN TWO LARGE-AREA SILICON DETECTORS TO MEASURE FLUXES OF PROTONS (ABOVE 30 MEV) IN THE PRESENCE OF HIGH FLUXES OF ELECTRONS. THE EXPERIMENT SAMPLE TIME WAS SYNCHRONIZED WITH THE SPACECRAFT SPIN, PERMITTING SECTORING OF THE READOUT OF THE MAIN AND LOW-ENERGY TELESCOPES INTO EIGHT OCTANTS ABOUT THE SPIN AXIS.

----- PIONEER 10, VAN ALLEN-----

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 72-012A-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A. VAN ALLEN	U OF IOWA
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BRIEF DESCRIPTION

THIS EXPERIMENT USED SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES IN INTERPLANETARY SPACE AND IN THE VICINITY OF JUPITER. DETECTOR GROUPINGS WERE AS FOLLOWS: (1) A THREE-ELEMENT (A, B, AND C) DIFFERENTIALLY SHIELDED TELESCOPE, WITH TUBE C SHIELDED OMNIDIRECTIONALLY AND USED FOR BACKGROUND SUBTRACTION TO PROVIDE DIRECTIONAL RATES SUCH AS A-C (5-21 MEV ELECTRONS AND 30-77.5 MEV PROTONS) AND B-C (0.55-21 MEV ELECTRONS AND 6.6-77.5 MEV PROTONS); (2) A THREE-ELEMENT (D, E, AND F) TRIANGULAR ARRAY, EACH ELEMENT RESPONDING TO ELECTRONS ABOVE 31 MEV AND PROTONS ABOVE 77.5 MEV; AND (3) A THIN-WINDOW TUBE (G) WITH A GOLD-PLATED ELBOW AS THE APERTURE WHICH ADMITTED SCATTERED ELECTRONS ABOVE 0.06 MEV WHILE DISCRIMINATING STRONGLY AGAINST PROTONS. SINGLE ELEMENT AND COINCIDENCE RATES WERE TELEMETERED FROM THE FIRST TWO TELESCOPES. THE TELEMETRY BIT RATE PREVAILING DURING THE JUPITER ENCOUNTER PERMITTED DIRECTIONAL SAMPLING IN INTERVALS OF ABOUT 14 DEG OF ROLL ABOUT THE SPIN AXIS. FOR FURTHER DETAILS, SEE BAKER AND VAN ALLEN, 'J. GEOPHYS. RES.' 81, 617, 1976.

----- PIONEER 10, WOLFE-----

INVESTIGATION NAME- PLASMA

NSSDC ID- 72-012A-13

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.M. WOLFE	NASA-ARC
OI - L.A. FRANK	U OF IOWA
OI - R. LUST	HPI-HEADQUARTERS
OI - D.S. INTRILLIGATOR	U OF SOUTHERN CALIF
OI - D.D. MCKIBBIN	NASA-ARC
OI - V.T. ZAVIENTSEFF	NASA-ARC
OI - F.L. SCARF	TRW SYSTEMS GROUP
OI - M.R. COLLARD	NASA-ARC
OI - W.C. FELDMAN	LOS ALAMOS NAT LAB
OI - Z.A. SMITH	NOAA-SEL

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF DUAL 90-DEG QUADRISPHERICAL ELECTROSTATIC ANALYZERS, ONE WITH 26 INDIVIDUAL PARTICLE DETECTORS AND THE OTHER WITH 5 CURRENT COLLECTORS. THE SYSTEM WAS CAPABLE OF MEASURING INCIDENT PLASMA DISTRIBUTION PARAMETERS OVER THE ENERGY RANGE 0.1 TO 18 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH-RESOLUTION ANALYZER, WITH A COUNTOUT OF 9 KEV/B PER KV APPLIED TO THE PLATES, HAD A MEAN PLATE RADIUS OF 9 CM AND SEPARATION OF 0.5 CM. THIS ANALYZER WAS USED TO MEASURE IONS ONLY, AND HAD 26 CHANNELTRONS MOUNTED ON THE SEMICIRCULAR EXIT TO THE ANALYZER. THE APERTURE POINTED THROUGH A WIDE SLIT IN THE BACK OF THE SPACECRAFT HIGH-GAIN ANTENNA REFLECTOR AND POINTED ALONG THE SPIN AXIS TOWARD THE EARTH (AND THEREFORE THE SUN). THE EDGES OF THE ANTENNA REFLECTOR LIMITED THE VIEWING OF THE INSTRUMENT TO 73 DEG WITH RESPECT TO THE SPIN AXIS. THE CHANNELTRONS COVERED A RANGE OF PLUS OR MINUS 51 DEG. EACH CHANNELTRON NEAR THE CENTER COVERED 3 DEG, AND APPROXIMATELY 8 DEG NEAR THE EDGES OF THE ANALYZER. THE ANGULAR WIDTH PERPENDICULAR TO THE LONG ANGULAR WIDTH WAS ABOUT 2 DEG. IN ONE HALF THE SPIN PERIOD, THE WHOLE CONE OF HALF ANGLE 51 DEG, CENTERED ON THE SUN, WAS SWEEPED OUT. A MEDIUM-ENERGY ANALYZER WITH A MEAN RADIUS OF 12 CM AND A 1-CM PLATE SEPARATION (CONSTANT OF 6 KEV/B PER KV APPLIED) WAS USED TO DETECT BOTH IONS AND ELECTRONS. THE DETECTORS WERE FIVE FLAT-SURFACE CURRENT COLLECTORS. THE THREE CENTER COLLECTORS EACH COVERED 15 DEG AND COVERED THE ANGULAR RANGE OF PLUS OR MINUS 22.5 DEG FROM THE SPIN AXIS. THE TWO OUTSIDE COLLECTORS HAD AN ANGULAR WIDTH OF 47.5 DEG AND WERE LOCATED AT PLUS OR MINUS 46.25 DEG FROM THE CENTER OF THE ANALYZER. THERE WERE A VARIETY OF POSSIBLE OPERATING MODES FOR THE EXPERIMENT; HOWEVER, THE PRINCIPAL MODE UTILIZED DURING THE ENCOUNTER PHASE WAS ONE IN WHICH THE ANALYZER PLATE POTENTIAL WAS STEPPED THROUGH ITS RANGE EVERY ONE-HALF REVOLUTION OF THE SPACECRAFT, AND ALL CURRENT COLLECTORS OR CHANNELTRONS WERE READ OUT AT THE PEAK FLUX ROLL ANGLE. THE HIGH- AND MEDIUM-RESOLUTION ANALYZERS OPERATED INDEPENDENTLY, SO THAT A CROSS-CHECK BETWEEN THESE ANALYZERS WAS POSSIBLE. THE DYNAMIC RANGE FOR THE PARTICLE FLUXES WAS FROM $1.0E+2$ TO $3.0E+9/50$ CM⁻²S AND THE PROTON TEMPERATURE COULD BE ASCERTAINED DOWN TO 2.0E3 DEG K.

***** PIONEER 11*****

SPACECRAFT COMMON NAME- PIONEER 11
ALTERNATE NAMES- PIONEER-G, PL-733C
6421

NSSDC ID- 73-019A

LAUNCH DATE- 04/06/73 WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL

MG - F.A. CARR	NASA HEADQUARTERS
SC - A.G. OPP	NASA HEADQUARTERS
PM - C.F. HALL	NASA-ARC
PS - P. DYAL	NASA-ARC

BRIEF DESCRIPTION

THIS WAS THE SECOND MISSION TO INVESTIGATE JUPITER AND THE OUTER SOLAR SYSTEM. PIONEER 11, LIKE PIONEER 10, USED JUPITER'S GRAVITATIONAL FIELD TO ALTER ITS TRAJECTORY RADICALLY. IT PASSED CLOSE TO SATURN, AND THEN AN ESCAPE TRAJECTORY FROM THE SOLAR SYSTEM WAS FOLLOWED. THE SPACECRAFT WAS 2.9 M (9.5 FT) LONG AND CONTAINED A 2.74-M (9-FT) DIAMETER HIGH-GAIN ANTENNA OF ALUMINUM HONEYCOMB SANDWICH MATERIAL WHOSE FEED WAS TOPPED WITH A MEDIUM-GAIN ANTENNA. A LOW-GAIN, OMNI-ANTENNA WAS MOUNTED BELOW THE HIGH-GAIN DISH. IT CONTAINED TWO NUCLEAR ELECTRIC-POWER GENERATORS, WHICH GENERATED 144 W AT JUPITER, BUT DECREASED TO 100 W AT SATURN. THERE WERE THREE REFERENCE SENSORS: A STAR (CANOPUS) SENSOR, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTION TO THE EARTH AND THE SUN, WITH THE KNOWN DIRECTION TO CANOPUS AS BACKUP. PIONEER 11'S STAR SENSOR GAIN AND THRESHOLD SETTINGS WERE MODIFIED, BASED ON EXPERIENCE FROM THAT OF PIONEER 10. TWEE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN-AXIS CONTROL (AT 4.8 RPM) AND CHANGE OF THE SPACECRAFT VELOCITY. THE THRUSTERS COULD BE FIRED STEADILY OR PULSED, BY COMMAND. COMMUNICATIONS WERE MAINTAINED VIA THE OMNI- AND MEDIUM-GAIN ANTENNAS, WHICH OPERATED TOGETHER, CONNECTED TO ONE RECEIVER, WHILE THE HIGH-GAIN ANTENNA WAS CONNECTED TO THE OTHER RECEIVER. THE RECEIVERS COULD BE INTERCHANGED BY COMMAND. TWO RADIO TRANSMITTERS, COUPLED TO TWO TRAVELING WAVE TUBE AMPLIFIERS, PRODUCED 8 W POWER EACH IN S-BAND. COMMUNICATION UPLINK (EARTH TO SPACECRAFT) OPERATED AT 2110 MHZ, AND DOWNLINK (SPACECRAFT TO EARTH) AT 2292 MHZ. AT JUPITER'S DISTANCE, ROUND-TRIP COMMUNICATION TIME TOOK 92 MIN. DATA WERE RECEIVED AT THE DEEP SPACE NETWORK. THE SPACECRAFT WAS TEMPERATURE-CONTROLLED TO BETWEEN -23 AND +38 DEG C (-10 TO +100 DEG F). AN ADDITIONAL EXPERIMENT, A LOW-SENSITIVITY FLUXGATE MAGNETOMETER, WAS ADDED TO THE PIONEER 11 PAYLOAD. INSTRUMENTS STUDIED THE INTERPLANETARY AND PLANETARY MAGNETIC FIELDS; SOLAR WIND PROPERTIES; COSMIC RAYS; TRANSITION REGION OF THE HELIOSPHERE; NEUTRAL HYDROGEN ABUNDANCE; DISTRIBUTION, SIZE, MASS, FLUX, AND VELOCITY OF DUST PARTICLES; JOVIAN AURORAE; JOVIAN RADIO WAVES; THE ATMOSPHERES OF PLANETS AND

SATELLITES; AND THE SURFACES OF JUPITER, SATURN, AND SOME OF THEIR SATELLITES. INSTRUMENTS CARRIED FOR THESE EXPERIMENTS WERE MAGNETOMETER, PLASMA ANALYZER (FOR SOLAR WIND), CHARGED PARTICLE DETECTOR, IONIZING DETECTOR, NON-IMAGING TELESCOPES WITH OVERLAPPING FIELDS OF VIEW TO DETECT SUNLIGHT REFLECTED FROM PASSING METEORIODS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING PENETRATION OF METEORIODS, UV PHOTOMETER, IR RADIOMETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AND MEASURED THE POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM CELESTIAL MECHANICS AND OCCULTATION PHENOMENA. THIS SPACECRAFT, LIKE PIONEER 10, CONTAINS PLAQUES THAT HAVE DRAWINGS DEPICTING MAN, WOMAN, AND LOCATION OF THE SUN AND EARTH IN THE GALAXY. PIONEER 11 WAS 36,800 KM FROM JUPITER DURING ITS CLOSEST APPROACH. IT PASSED BY SATURN AUG. 5, 1979.

----- PIONEER 11, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 73-019A-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
ASTRONOMY
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON
OI - G.W. NULL

NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

TWO-WAY DOPPLER TRACKING OF THE SPACECRAFT WAS USED TO MAKE MORE PRECISE DETERMINATIONS OF PLANETARY MASSES, THE HELIOCENTRIC ORBITS OF JUPITER AND SATURN, AND THE GRAVITATIONAL FIELDS OF THE SUN, JUPITER, SATURN, AND THE GALILEAN AND SATURNIAN SATELLITES.

----- PIONEER 11, FILLIUS-----

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 73-019A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
PLANETOLOGY

PERSONNEL

PI - R.W. FILLIUS
OI - C.E. MCILWAIN

U OF CALIF, SAN DIEGO
U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN ARRAY OF FIVE PARTICLE DETECTORS WITH ELECTRON THRESHOLDS IN THE RANGE .01 TO 35 MEV AND PROTON THRESHOLDS IN THE RANGE 0.15 TO 80 MEV. A CERENKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND C4) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 5, 8, 12, AND 1 MEV, RESPECTIVELY. AN ELECTRON SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A MINIMUM IONIZATION COUNTER (M) HAD THREE OUTPUT CHANNELS: M1, SENSITIVE TO ELECTRONS HAVING ENERGIES GREATER THAN 35 MEV; M2, MEASURED BACKGROUND; AND M3, SENSITIVE TO PROTONS HAVING ENERGIES GREATER THAN 80 MEV. THE LAST TWO SENSORS WERE SCINTILLATOR DETECTORS (SP AND SE), BOTH OF WHICH HAD ENERGY THRESHOLDS OF 10 KEV FOR ELECTRONS AND 150 KEV FOR PROTONS. THE SENSITIVITY OF THE SE DETECTOR TO PROTONS WAS ABOUT A FACTOR OF 10 LOWER THAN ITS SENSITIVITY TO ELECTRONS. THUS, THE SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READOUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT-RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT-RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 108 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULARLY TO THE SPIN AXIS AND THE SPIN RATE WAS 5 RPM, PITCH-ANGLE MEASUREMENTS WERE OBTAINED. WHILE THIS EXPERIMENT WAS PRIMARILY DESIGNED FOR ENCOUNTER STUDIES, SOME DATA WERE OBTAINED AT LOW RATES IN INTERPLANETARY SPACE. A DESCRIPTION OF THE INSTRUMENTATION AND INITIAL PIONEER 10 RESULTS WAS PUBLISHED IN JGR, 79, 3589, 1974.

----- PIONEER 11, GENRELS-----

INVESTIGATION NAME- IMAGING PHOTOPOLARIMETER (IPP)

NSSDC ID- 73-019A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - GENRELS
OI - J.L. COFFIN
OI - HAREEN-ANTTILA
OI - C.E. KENKNIGHT
OI - R.F. HUMMER
OI - M.G. TONASKO
OI - W. SWINDELL

U OF ARIZONA
NASA-GISS
U OF ARIZONA
U OF ARIZONA
SANTA BARBARA RES CTR
U OF ARIZONA
U OF ARIZONA

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT USED DURING JOVIAN AND SATURNIAN ENCOUNTER MADE SIMULTANEOUS, TWO-COLOR (BLUE - 3900 TO 4900 A, RED - 5800 TO 7800 A) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE-RESOLUTION (ABOUT 200 KM AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES AND SATURN AND SOME OF ITS SATELLITES. THE POLARIMETRIC AND RADIOMETRIC WORK WAS PERFORMED USING AN 8- BY 8-MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5- BY 0.5-MRAD APERTURE STOP. RELATIVE RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN LAMP. LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSOR/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE. PRIMARY RADIOMETRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE BACKLIGHTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSUUTOV TELESCOPE OF FOCAL RATIO F/3.6, (2) A FOCAL-PLANE WHEEL CONTAINING FOV APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT THE LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTED WAVELENGTHS OF LESS THAN 5500 A (BLUE BEAM) AND TRANSMITTED ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) A FILTERING-COATED RELAY LENS AND FOLDING MIRRORS FOR EACH SPECTRAL BEAM (THE TWO POLARIZATIONS WERE SEPARATED), AND (6) TWO BENDIX CHANNELTRON (BLUE - BIALKALI 5-11, RED - 5-20) PHOTOCATHODES FOR EACH SPECTRAL BEAM TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 11, INGERSOLL-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 73-019A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - A.P. INGERSOLL
OI - R.W. BOESE
OI - S.C. CHASE, JR.
OI - G. NEUGEBAUER
OI - L.M. TRAFTON

CALIF INST OF TECH
NASA-ARC
SANTA BARBARA RES CTR
CALIF INST OF TECH
U OF TEXAS, AUSTIN

BRIEF DESCRIPTION

THE PIONEER 11 INFRARED RADIOMETER EXPERIMENT MEASURED THE JOVIAN AND SATURNIAN THERMAL BALANCE, TEMPERATURE DISTRIBUTION IN THE OUTER ATMOSPHERE, GENERAL SURFACE COMPOSITION (INCLUDING THE OVERALL HYDROGEN-TO-HELIUM RATIO), AND DARK-SIDE TEMPERATURE. THE INSTRUMENT CONSISTED OF A 7.62-CM (3-IN.) REFLECTING CASSEGRAIN TELESCOPE WITH A 1-DEG BY 3-DEG FIELD OF VIEW THAT ILLUMINATED A PAIR OF 88-CHANNEL, THIN-FILM BIMETALLIC THERMOPILES IN TWO BANDS OF THE IR SPECTRUM (14 TO 25 MICROMETERS AND 19 TO 56 MICROMETERS) TO MEASURE THE IRRADIANCE. THE TWO-CHANNEL RADIOMETER WAS SIMILAR TO THOSE FLOWN ON MARINER 6 AND 7, BUT WAS MORE ACCURATE AND HAD BETTER SPATIAL RESOLUTION.

----- PIONEER 11, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 73-019A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY
PARTICLES AND FIELDS

PERSONNEL

PI - D.L. JUDGE
OI - R.W. CARLSON

U OF SOUTHERN CALIF
NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, A BROADBAND PHOTOMETER SENSITIVE BETWEEN 200 AND 800 A, FOUND EVIDENCE OF HELIUM, WHICH IN TURN INDICATED INTERACTIONS BETWEEN CHARGED PARTICLES AND NEUTRAL HYDROGEN. DURING THE CRUISE PHASE OF THE MISSION, THIS EXPERIMENT WAS USED TO SEARCH FOR THE SUPERSONIC-TO-SUBSONIC TRANSITION REGION IN THE SOLAR WIND. DURING THE JOVIAN ENCOUNTER, THIS EXPERIMENT WAS USED TO LOOK FOR EVIDENCE OF AN AURORAL OVAL ON THE JOVIAN DAYSIDE, TO FIND THE RATIO OF HYDROGEN TO HELIUM IN THE JOVIAN ATMOSPHERE, AND TO FIND THE TEMPERATURE OF THE OUTER PORTION OF THE JOVIAN ATMOSPHERE.

----- PIONEER 11, KINARD-----

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 73-019A-04

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY DUST

PERSONNEL

PI - W.H. KINARD
OI - J.M. ALVAREZ
OI - D.H. MURES

NASA-LARC
NASA-LARC
NASA-LARC

BRIEF DESCRIPTION

THE PIONEER 11 METEOROID DETECTION EXPERIMENT ATTEMPTED TO DETECT THE DISTRIBUTION IN INTERPLANETARY SPACE OF METEORIDS TOO SMALL TO BE SEEN BY LIGHT-SCATTERING TECHNIQUES. TWELVE PANELS, EACH CONTAINING 18 PRESSURIZED CELLS, WERE MOUNTED ON THE BACK OF THE SPACECRAFT ANTENNA DISH. THE PRESSURIZED CELLS CONSISTED OF A 5.081-5 M THICK STAINLESS STEEL OUTER LAYER WELDED TO A 2.541-5 M THICK STAINLESS STEEL INNER LAYER, WITH A LARGE NUMBER OF SMALL POCKETS OF GAS TRAPPED BETWEEN THEM. LOSS OF GAS PRESSURE FROM ANY OF THE CELLS INDICATED A HIT, AND THE RATE OF GAS LOSS INDICATED THE SIZE OF THE HOLE MADE. THUS, THE MASS AND INCIDENT ENERGY OF EACH METEOROID PARTICLE COULD BE OBTAINED, AND WHEN COMBINED WITH THE TRAJECTORY DATA, ALLOWED THE SPATIAL DENSITY OF THE METEORIDS TO BE DETERMINED. THE PANELS DETECTED IMPACTS OF PARTICLES HAVING A MASS OF GREATER THAN 1.6-8 G. THE PANELS COVERED 0.46 SQ M. OF EXPOSED AREA ON PIONEER 11. RESULTS FROM THIS EXPERIMENT WERE COMBINED WITH THOSE FROM A SIMILAR EXPERIMENT FLOWN ON PIONEER 10 TO DETERMINE THE RANGE IN MASS OF SMALL PARTICLES ON BOTH THE INNER AND OUTER BOUNDARIES AND WITHIN THE ASTEROID BELT.

----- PIONEER 11, KLIOR-----

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 73-019A-10

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. KLIOR
OI - G. FJELDRO
OI - D.L. CAIN
OI - H.L. SEIDEL
OI - S.L. RASOOL

NASA-JPL
NASA-JPL
NASA-JPL
NASA-JPL
NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED THE S-BAND (2292-MHZ, R-W) SPACECRAFT RADIO TRANSMITTER SIGNAL CHARACTERISTICS TO OBTAIN INFORMATION ABOUT THE IONOSPHERES AND ATMOSPHERES OF JUPITER AND ITS SATELLITE IO, AND SATURN. ENTRANCE INTO AND EXIT FROM JUPITER AND IO OCCULTATION PROVIDED CHANGES IN THE SIGNAL CHARACTERISTICS FROM WHICH ATMOSPHERIC TEMPERATURE, PRESSURE, AND ELECTRON DENSITY PROFILES COULD BE CALCULATED. TEMPERATURE AND PRESSURE PROFILES WERE LIMITED TO LEVELS ABOVE THE PRESSURE OF ONE EARTH ATMOSPHERE. SIGNAL OCCULTATION ALSO PROVIDED A DETERMINATION OF THE PLANETARY DIAMETER.

----- PIONEER 11, McDONALD-----

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 73-019A-12

INVESTIGATIVE PROGRAM
CODE 5L/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - F.H. McDONALD
OI - K.G. MCCracken
OI - W.R. WEBBER
OI - E.C. ROLLOP
OI - H.J. TEGARDIN
OI - J.M. TRINOR

NASA-GSFC
CSIRO
U OF NEW HAMPSHIRE
APPLIED PHYSICS LAB
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE 3-ELEMENT TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXES. A BIDIIRECTIONAL TELESCOPE MEASURED 20- TO 100-MEV/NUCLEON PARTICLES WITH 5 TO 10 PERCENT ENERGY RESOLUTION. ANOTHER TELESCOPE MEASURED 3- TO 22-MEV/NUCLEON PARTICLES WITH 5 PERCENT RESOLUTION. THESE TWO TELESCOPES MEASURED PARTICLES WITH Z VALUES BETWEEN 1 AND 9. THE THIRD TELESCOPE MEASURED 50-KEV TO 1-MEV ELECTRONS AND 50-KEV TO 20-MEV PROTONS WITH 20 PERCENT RESOLUTION.

----- PIONEER 11, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 73-019A-02

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON
OI - J.J. O'GALLAGHER
OI - A. TUZZOLINO

U OF CHICAGO
U OF MARYLAND
U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLLIMATED ELEMENTS (THREE SOLID STATE, ONE CSI, AND ONE SAPPHIRE (ERENKOV)) SURROUNDED BY A PLASTIC ANTICINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG. FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS, PERMITTING 6-SECTORED INFORMATION ON PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS THROUGH NI OR OF THE ELECTRONS AND THE ISOTOPES OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG. FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SECTORS.

----- PIONEER 11, SMITH-----

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- 73-019A-01

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS

PERSONNEL

PI - E.J. SMITH
OI - D.S. COLBURN
OI - P. DYAL
OI - C.P. SONEIT
OI - P.J. COLEMAN, JR.
OI - L. DAVIS, JR.
OI - C.E. JONES

NASA-JPL
NASA-ARC
NASA-ARC
U OF ARIZONA
U OF CALIF, LA
CALIF INST OF TECH
BRIGHAM YOUNG U

BRIEF DESCRIPTION

THE MAGNETOMETER ON PIONEER 11 WAS A TRIAXIAL HELIUM MAGNETOMETER WITH SEVEN DYNAMIC RANGES, FROM PLUS OR MINUS 2.5 NT TO PLUS OR MINUS 1.0E-3 T. THE LINEARITY WAS 0.1 PERCENT AND THE NOISE THRESHOLD WAS 0.01 NT RMS FOR 0-1 HZ. THE ACCURACY WAS 0.5 PERCENT OF FULL SCALE RANGE. THE EXPERIMENTER USED RTN COORDINATES IN THE DATA ANALYSIS. IN THIS SYSTEM, R (OR X) IS RADIIALLY OUTWARD FROM THE SUN, T (OR Y) WAS PARALLEL TO THE SUN'S EQUATORIAL PLANE AND HAD ITS DIRECTION GIVEN BY THE CROSS PRODUCT OF THE SUN'S SPIN VECTOR INTO THE RADIAL DIRECTION (I.E., INTO R) AND N (OR Z) COMPLETED THE RIGHT-HANDED ORTHOGONAL SYSTEM (POSITIVE NORTHWARD). A DETAILED INSTRUMENT DESCRIPTION MAY BE FOUND IN SMITH ET AL., 'IEEE TRANS. ON MAGNETICS,' VOL. M-11, P 962, JULY 1975.

----- PIONEER 11, VAN ALLEN-----

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 73-019A-11

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A. VAN ALLEN

U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT USED SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES NEAR JUPITER AND SATURN. DETECTOR GROUPINGS WERE AS FOLLOWS: (1) A THREE-ELEMENT (A, B, AND C) DIFFERENTIALLY SHIELDED TELESCOPE. TUBE C WAS SHIELDED OMNIDIRECTIONALLY AND WAS USED FOR BACKGROUND SUBTRACTION TO PROVIDE RATES SUCH AS A-C (5 TO 21 MEV ELECTRONS AND 30 TO 77.5 MEV PROTONS) AND B-C (0.55 TO 21 MEV ELECTRONS AND 6.6 TO 77.5 MEV PROTONS); (2) A THREE-ELEMENT TRIANGULAR ARRAY, EACH ELEMENT RESPONDING TO ELECTRONS ABOVE 31 MEV AND PROTONS ABOVE 77.5 MEV; AND (3) A THIN-WINDOW TUBE (G) WITH A GOLD-PLATED ELBOW AS THE ENTRANCE APERTURE TO ADMIT SCATTERED ELECTRONS ABOVE 0.06 MEV WHILE DISCRIMINATING STRONGLY AGAINST PROTONS. FOR A DESCRIPTION OF THE SIMILAR EXPERIMENT ON PIONEER 10 SEE VAN ALLEN ET AL., JGR, 79, 3345, 1974. EARLY RESULTS ARE GIVEN IN SCIENCE, 188, 455, 1975.

----- PIONEER 11, WOLFE-----

INVESTIGATION NAME- PLASMA

NSSDC ID- 73-019A-13

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.M. WOLFE	NASA-ARC
O1 - L.A. FRANK	U OF IOWA
O1 - R. LUST	MPI-HEADQUARTERS
O1 - D.S. INTRILIGATOR	U OF SOUTHERN CALIF
O1 - V.T. ZAVIENTSEFF	NASA-ARC
O1 - Z.A. SMITH	NOAA-SEL
O1 - F.L. SCARF	TPW SYSTEMS GROUP
O1 - H.R. COLLARD	NASA-ARC
O1 - W.C. FELDMAN	LOS ALAMOS NAT LAB
O1 - D.D. MCKIBBIN	NASA-ARC

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF DUAL 90-DEG QUADRISPHERICAL ELECTROSTATIC ANALYZERS, ONE WITH 26 INDIVIDUAL PARTICLE DETECTORS AND THE OTHER WITH 5 CURRENT COLLECTORS. THE SYSTEM WAS CAPABLE OF MEASURING INCIDENT PLASMA DISTRIBUTION PARAMETERS OVER THE ENERGY RANGE 0.1 TO 16 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH-RESOLUTION ANALYZER WITH A COUNTOUT OF 4 KEV/Q PER KV APPLIED TO THE PLATES, HAD A MEAN PLATE RADIUS OF 9 CM AND SEPARATION OF 0.5 CM. THIS ANALYZER WAS USED TO MEASURE IONS ONLY, AND HAD 26 CHANNELTRONS MOUNTED ON THE SEMICIRCULAR EXIT TO THE ANALYZER. THE APERTURE POINTED THROUGH A WIDE SLIT IN THE BACK OF THE SPACECRAFT HIGH-GAIN ANTENNA REFLECTOR AND POINTED ALONG THE SPIN AXIS TOWARD THE EARTH (AND THEREFORE THE SUN). THE EDGES OF THE ANTENNA REFLECTOR LIMITED THE VIEWING OF THE INSTRUMENT TO 73 DEG WITH RESPECT TO THE SPIN AXIS. THE CHANNELTRONS COVERED A RANGE OF PLUS OR MINUS 51 DEG. EACH CHANNELTRON NEAR THE CENTER COVERED 3 DEG AND APPROXIMATELY 8 DEG NEAR THE EDGES OF THE ANALYZER. THE ANGULAR WIDTH PERPENDICULAR TO THE LONG ANGULAR WIDTH WAS ABOUT 2 DEG. IN HALF THE SPIN PERIOD THE WHOLE CONE OF HALF-ANGLE 51 DEG CENTERED ON THE SUN WAS SWEEPED OUT. A MEDIUM ENERGY ANALYZER WITH A MEAN RADIUS OF 12 CM AND A 1 CM PLATE SEPARATION (CONSTANT OF 6 KEV/Q PER KV APPLIED) WAS USED TO DETECT BOTH IONS AND ELECTRONS. THE DETECTORS WERE FIVE FLAT-SURFACE CURRENT COLLECTORS. THE THREE CENTER COLLECTORS EACH COVERED 15 DEG AND COVERED THE ANGULAR RANGE OF PLUS OR MINUS 22.5 DEG FROM THE SPIN AXIS. THE TWO OUTSIDE COLLECTORS HAD AN ANGULAR WIDTH OF 47.5 DEG AND WERE LOCATED AT PLUS OR MINUS 46.25 DEG FROM THE CENTER OF THE ANALYZER. THERE WERE A VARIETY OF POSSIBLE OPERATING MODES FOR THE EXPERIMENT; HOWEVER, THE PRINCIPAL MODE UTILIZED DURING THE ENCOUNTER PHASE WAS ONE IN WHICH THE ANALYZER PLATE POTENTIAL WAS STEPPED THROUGH ITS RANGE EVERY ONE-HALF REVOLUTION OF THE SPACECRAFT, AND ALL CURRENT COLLECTORS OR CHANNELTRONS WERE READ OUT AT THE PEAK FLUX ROLL ANGLE. THE HIGH AND MEDIUM RESOLUTION ANALYZERS OPERATED INDEPENDENTLY, SO A CROSS CHECK BETWEEN THESE ANALYZERS WAS POSSIBLE. THE DYNAMIC RANGE FOR THE PARTICLE FLUXES WAS FROM 1.0×10^2 TO 3.0×10^9 CM⁻² S⁻¹ AND THE PROTON TEMPERATURE DOWN TO 2.0×10^3 DEG K COULD BE ASCERTAINED.

***** PIONEER VENUS 1*****

SPACECRAFT COMMON NAME- PIONEER VENUS 1

ALTERNATE NAMES- PIONEER VENUS 1978 ORBIT, 10911
PIONEER VENUS ORBITER

NSSDC ID- 78-051A

LAUNCH DATE- 05/20/78 WEIGHT- 517. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- VENUS ORBITER	EPOCH DATE- 12/04/78
ORBIT PERIOD- 1440. MIN	INCLINATION- 105. DEG
PERIAPSIS- 200. KM ALT	APOAPSIS- 66614. KM ALT

PERSONNEL

MG - F.D. KOCHENDORFER	NASA HEADQUARTERS
SC - R.E. MURPHY	NASA HEADQUARTERS
PM - C.F. HALL	NASA-ARC
PS - L. COLIN	NASA-ARC

BRIEF DESCRIPTION

PIONEER VENUS 1 WAS THE FIRST OF TWO MISSIONS DESIGNED TO CONDUCT A COMPREHENSIVE INVESTIGATION OF THE ATMOSPHERE OF VENUS. THE SPACECRAFT WAS A SOLAR-POWERED CYLINDER ABOUT 250 CM IN DIAMETER WITH ITS SPIN AXIS SPIN-STABILIZED PERPENDICULAR TO THE ECLIPTIC PLANE. A HIGH-GAIN ANTENNA WAS MECHANICALLY DESIGNED TO REMAIN FOCUSED ON THE EARTH. THE INSTRUMENTS WERE MOUNTED ON A SHELF WITHIN THE SPACECRAFT EXCEPT FOR A MAGNETOMETER MOUNTED AT THE END OF A BOOM TO INSURE AGAINST MAGNETIC INTERFERENCE FROM THE SPACECRAFT. PIONEER VENUS 1 MEASURED THE DETAILED STRUCTURE OF THE UPPER ATMOSPHERE AND IONOSPHERE OF VENUS, INVESTIGATED THE INTERACTION OF THE SOLAR WIND WITH THE IONOSPHERE AND THE MAGNETIC FIELD IN THE VICINITY OF VENUS, DETERMINED THE CHARACTERISTICS OF THE ATMOSPHERE AND

SURFACE OF VENUS ON A PLANETARY SCALE, DETERMINED THE PLANET'S GRAVITATIONAL FIELD HARMONICS FROM PERTURBATIONS OF THE SPACECRAFT ORBIT, AND DETECTED GAMMA-RAY BURSTS.

----- PIONEER VENUS 1, BRACE-----

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- 78-051A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES

PERSONNEL

PI - L.W. BRACE	NASA-GSFC
O1 - M.B. MCCLROY	IAW AND U
O1 - A. PEDERSEN	ES-ESTEC
O1 - A.F. NAGY	U OF MICHIGAN
O1 - T.M. DONAHUE	U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A PAIR OF CYLINDRICAL LANGMUIR PROBES OF THE TYPE USED ON THE ATMOSPHERIC EXPLORER (AE) SERIES. TWO PROBES WERE REQUIRED, SO THAT ONE WAS ALWAYS OUT OF THE WAKE OF THE SPACECRAFT. IN FLIGHT ANALYSIS, 56 MEASUREMENTS TAKEN AT A RATE OF ONE PER S PROVIDED HIGH SPATIAL RESOLUTION FOR THE MEASUREMENTS OF NE AND TE. THE RESULTS OF THESE HIGH-RESOLUTION MEASUREMENTS WERE USED BOTH TO STUDY THE UPPER ATMOSPHERE AND IONOSPHERE AND TO INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH THE VENUSIAN IONOSPHERE. THIS EXPERIMENT PROVIDED MEASUREMENTS OVER THE WHOLE REGION TRAVERSED BY THE ORBITER, COVERING A LARGE RANGE OF SOLAR ASPECT ANGLES, TO YIELD A MORE COMPLETE CONFIGURATION OF THE PHYSICAL PROPERTIES OF THE IONOPAUSE REGION.

----- PIONEER VENUS 1, CROFT-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 78-051A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

TL - T.A. CROFT	SRI INTERNATIONAL
TM - G.M. KEATING	NASA-LARC
TM - A.J. KLIORE	NASA-JPL
TM - R. PHILLIPS	NASA-JPL
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - R. WOO	NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM HAD THE RESPONSIBILITY FOR PLANNING, COORDINATING, AND RECOMMENDING SCIENTIFIC USES OF RADIO SIGNALS, EXECUTING APPROVED EXPERIMENTS, AND CONDUCTING THE DATA ANALYSIS REQUIRED. MAJOR FIELDS OF INTEREST INCLUDED THE GRAVITY FIELD OF VENUS, VERTICAL STRUCTURE OF THE DAYTIME AND NIGHTTIME IONOSPHERES, NEUTRAL ATMOSPHERE TEMPERATURE, PRESSURE AND DENSITY, HORIZONTAL GRADIENTS OF ATMOSPHERIC PROPERTIES, AND SMALL-SCALE TURBULENCE IN THE ATMOSPHERE.

----- PIONEER VENUS 1, DONAHUE-----

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- 78-051A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - T.M. DONAHUE	U OF MICHIGAN
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BRIEF DESCRIPTION

THIS INVESTIGATION COMBINED RESULTS OBTAINED FROM THE ORBITER MISSION WITH RESULTS FROM THE MULTI-PROBE MISSION TO OBTAIN A UNIFIED PICTURE OF THE ATMOSPHERIC AND IONOSPHERIC CHEMISTRY AND TRANSPORT PROCESSES OCCURRING IN THE ATMOSPHERE OF VENUS.

----- PIONEER VENUS 1, EVANS-----

INVESTIGATION NAME- TRANSIENT GAMMA-RAY SOURCES

NSSDC ID- 78-051A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - W.D. EVANS	LOS ALAMOS NAT LAB
O1 - J.P. CONNER	LOS ALAMOS NAT LAB
O1 - P.R. HIGBIE	LOS ALAMOS NAT LAB
O1 - R.W. KLEBESADEL	LOS ALAMOS NAT LAB
O1 - R.A. OLSON	LOS ALAMOS NAT LAB
O1 - I.B. STRONG	LOS ALAMOS NAT LAB
O1 - R.E. SPALDING	SANDIA LABORATORIES

BRIEF DESCRIPTION

AN OMNIDIRECTIONAL GAMMA-RAY DETECTOR EMPLOYING TWO PHOSWICH SCINTILLATION SPECTROMETERS SENSITIVE TO PROTONS FROM 0.2 TO 2.0 MEV WAS USED WITH LOGIC CIRCUITRY TO DETECT THE BEGINNING OF A GAMMA EVENT AND TO INITIATE A PERIOD OF RAPID DATA COLLECTION. DATA WERE STORED IN A MEMORY UNIT FOR SUBSEQUENT TRANSMISSION TO EARTH. CONFIRMATION THAT A TRUE GAMMA EVENT HAD OCCURRED WAS OBTAINED BY COMPARISON WITH RESULTS FROM OTHER EXPERIMENTS IN EARTH SATELLITES. THIS EXPERIMENT PROVIDED THE LONG-BASELINE TIME CORRELATIONS NECESSARY FOR CALCULATING ACCURATE SOURCE LOCATIONS.

----- PIONEER VENUS 1, HANSEN-----

INVESTIGATION NAME- CLOUD PHOTOPOLARIMETER

NSSDC ID- 78-051A-06	INVESTIGATIVE PROGRAM CODE SL
	INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES

PERSONNEL

PI - J.E. HANSEN	NASA-GISS
O1 - P.M. STONE	MASS INST OF TECH
O1 - A.A. LACIS	NASA-GISS
O1 - D.L. COFFEEN	NASA-GISS
O1 - L. TRAVIS	NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT USED A SIMPLIFIED VERSION OF THE IMAGING PHOTOPOLARIMETER FLOWN ON PIONEERS 10 AND 11 TO PROVIDE LOW-RESOLUTION, FOUR-COLOR MAPS OF THE VENUSIAN CLOUD COVER WITH A HIGH-RESOLUTION IMAGING CAPABILITY NEAR APOCENTER. THE PRINCIPAL OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE PROPERTIES OF THE CLOUDS AND HAZE, INCLUDING THE VERTICAL AND HORIZONTAL DISTRIBUTION OF THE PARTICLES, CLOUD PARTICLE SIZE AND REFRACTIVE INDEX, THE CLOUD-TOP HEIGHT, AND THE NUMBER DENSITY OF PARTICLES.

----- PIONEER VENUS 1, KNUDSEN-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 78-051A-07	INVESTIGATIVE PROGRAM CODE SL/CO-OP
	INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES PLANETARY IONOSPHERES

PERSONNEL

PI - W.C. KNUDSEN	LOCKHEED PALO ALTO
O1 - K. SPENNER	INST FUR PHYS WELTRAUM
O1 - R.C. WHITTEN	NASA-ARC

BRIEF DESCRIPTION

THIS INVESTIGATION USED A LANGMUIR-PROBE RETARDING-POTENTIAL ANALYZER DESIGNED TO MEASURE ELECTRON CONCENTRATION AND TEMPERATURE, MAJOR ION CONCENTRATIONS AND TEMPERATURES, ION DRIFT VELOCITIES, AND THE ENERGY DISTRIBUTION FUNCTION OF AMBIENT PHOTOELECTRONS. IT WAS AN ADAPTATION OF THE INSTRUMENT FLOWN ON THE GERMAN AEROS SATELLITE IN 1972. EITHER ONE OF TWO SENSOR HEADS COULD BE USED, EACH CONSISTING OF A MULTIGRID CUP AND ELECTROMETER, WHICH COULD OPERATE IN ELECTRON, ION, OR PHOTOELECTRON MODES, INITIATED BY SPACECRAFT ROLL PULSES. THE MEASUREMENTS TAKEN WHEN THE SENSOR AXIS WAS CLOSEST TO THE PLASMA FLOW VELOCITY VECTOR WERE TRANSMITTED. THE AIMS OF THE INVESTIGATION WERE TO IMPROVE KNOWLEDGE OF THE IMPORTANT IONIC REACTIONS IN THE VENUSIAN IONOSPHERE, TO STUDY THE PLASMA TRANSPORT PROCESSES TO DETERMINE IF VENUS HAS A POLAR WIND, TO STUDY THE PROCESSES AT THE SOLAR WIND-IONOSPHERE BOUNDARY, AND TO STUDY SIMILAR AIMS CONCERNING THE AMBIENT ELECTRON POPULATION.

----- PIONEER VENUS 1, MASURSKY-----

INVESTIGATION NAME- PARTICIPATING THEORIST MASURSKY

NSSDC ID- 78-051A-08	INVESTIGATIVE PROGRAM CODE SL
	INVESTIGATION DISCIPLINE(S) GEODESY AND CARTOGRAPHY PLANETOLOGY

PERSONNEL

PI - M. MASURSKY	US GEOLOGICAL SURVEY
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BRIEF DESCRIPTION

SURFACE PROFILE, ROUGHNESS, AND ELECTRICAL PROPERTIES DATA FROM THE PIONEER VENUS RADAR ALTIMETER WERE ANALYZED IN CONJUNCTION WITH SPACECRAFT-DERIVED GRAVITY INFORMATION AND EARTH-BASED RADAR BACKSCATTER DATA TO PRODUCE A SERIES OF CARTOGRAPHIC AND GEOLOGIC MAPS. THE INITIAL MAPS INCLUDED GEOMETRIC ARRAYS OF RADAR PROFILES AND TOPOGRAPHIC CONTOUR DATA. THESE WERE THEN UTILIZED TO PRODUCE A SHADED RELIEF CARTOGRAPHIC MAP, SCALE 1 TO 25 MILLION, WITH SUPERIMPOSED CONTOUR INFORMATION. PRELIMINARY VENUSIAN GEOLOGIC INFORMATION, INFERRED FROM ALL AVAILABLE SPACECRAFT AND EARTH-BASED RADAR DATA SOURCES, WILL SUBSEQUENTLY BE ADDED TO THE CARTOGRAPHIC MAP BASE TO PRODUCE GEOLOGIC MAPS. IT IS ANTICIPATED THAT ONE TO THREE LARGER-SCALE (1 TO 5 MILLION) CARTOGRAPHIC AND GEOLOGIC MAPS OF SCIENTIFICALLY INTERESTING VENUS SURFACE FEATURES ALSO WILL BE PRODUCED.

----- PIONEER VENUS 1, MCGILL-----

INVESTIGATION NAME- PARTICIPATING THEORIST MCGILL

NSSDC ID- 78-051A-09	INVESTIGATIVE PROGRAM CODE SL
	INVESTIGATION DISCIPLINE(S) PLANETOLOGY

PERSONNEL

PI - G.E. MCGILL	U OF MASSACHUSETTS
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BRIEF DESCRIPTION

INVESTIGATIONS OF THE TOPOGRAPHY AND GEOLOGY OF VENUS WERE UNDERTAKEN TO ASSURE CORRECT RECOGNITION OF TOPOGRAPHIC AND MATERIAL CHARACTERISTICS OF THE PLANET AND TO ARRIVE AT THE GEOLOGICAL AND GEOPHYSICAL INTERPRETATION OF THESE CHARACTERISTICS.

----- PIONEER VENUS 1, NAGY-----

INVESTIGATION NAME- PARTICIPATING THEORIST NAGY

NSSDC ID- 78-051A-10	INVESTIGATIVE PROGRAM CODE SL
	INVESTIGATION DISCIPLINE(S) AERONOMY PLANETARY IONOSPHERES PLANETARY ATMOSPHERES

PERSONNEL

PI - A.F. NAGY	U OF MICHIGAN
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BRIEF DESCRIPTION

INVESTIGATIONS OF THE IONOSPHERE OF VENUS WERE OPTIMIZED BY EXTENDING CURRENT MODELS AND FORMULATING A MISSION PLAN BEST SUITED TO ADDRESS TOPICS INCLUDING THE PHYSICS OF THE SOLAR WIND-IONOSPHERE INTERACTION, ENERGETICS OF THE UPPER ATMOSPHERE, ION CHEMISTRY, AND THE PROCESSES RESPONSIBLE FOR THE GENERAL STRUCTURE OF THE IONOSPHERE, INCLUDING MECHANISMS RESPONSIBLE FOR THE MAINTENANCE OF THE NIGHTTIME IONOSPHERE.

----- PIONEER VENUS 1, NIEMANN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- 78-051A-11	INVESTIGATIVE PROGRAM CODE SL
	INVESTIGATION DISCIPLINE(S) AERONOMY PLANETARY ATMOSPHERES

PERSONNEL

PI - H.B. NIEMANN	NASA-GSFC
O1 - G.R. CARIGNAN	U OF MICHIGAN
O1 - R.E. HARTLE	NASA-GSFC
O1 - M.W. SPENCER	NASA-GSFC

BRIEF DESCRIPTION

THE EXPERIMENT USED A QUADRUPOLE MASS SPECTROMETER WITH THREE ION-SOURCE OPERATING MODES AND THREE MASS-SCANNING MODES. THE ION SOURCE COULD BE OPERATED ALTERNATELY IN OPEN AND CLOSED CONFIGURATIONS TO INCREASE ACCURACY. AN ADAPTIVE MASS SCAN WAS USED TO REDUCE THE BIT RATE REQUIRED FOR A GIVEN INFORMATION-RETURN RATE. THE RESOLUTION WAS 1.5×10^4 FOR ADJACENT MASSES, AND THE MASS RANGE WAS 1 TO 45 U. VERTICAL AND HORIZONTAL DENSITY VARIATIONS OF THE MAJOR NEUTRAL CONSTITUENTS OF THE UPPER ATMOSPHERE OF VENUS WERE DETECTED AND MEASURED TO DEFINE THE DYNAMIC, CHEMICAL, AND THERMAL STATES OF THE UPPER ATMOSPHERE. IMPORTANT CONSTITUENTS MEASURED WERE HE, O, O₂, CO, CO₂ AND/OR N₂, AND A. IT WAS ALSO POSSIBLE TO STUDY H₂, D AND/OR H₂, C, AND NO.

----- PIONEER VENUS 1, PETTENUILL-----

INVESTIGATION NAME- RADAR ALTIMETER

NSSDC ID- 78-051A-02

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLUCY

PERSONNEL

PI - G. PETTENGILL	MASS INST OF TECH
O1 - W.E. BROWN, JR.	NASA-JPL
O1 - W.M. KAULA	U OF CALIF, LA
O1 - D.W. STAELIN	MASS INST OF TECH

BRIEF DESCRIPTION

A RADAR ALTIMETER WAS USED TO OBTAIN INFORMATION ON THE ORBITER ALTITUDE, PLANETARY SURFACE TEMPERATURE, AND RADAR SCATTERING PROPERTIES IN ORDER TO INFER THE SURFACE TOPOGRAPHY, GEOLOGY, AND THE THERMAL AND MECHANICAL PROPERTIES OF THE INTERIOR OF VENUS. THE WEIGHT OF THE INSTRUMENT WAS 9.0 KG (20 LB), AND THE POWER CONSUMPTION WAS 25 W.

----- PIONEER VENUS 1, RUSSELL-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-051A-12

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.T. RUSSELL	U OF CALIF, LA
O1 - P.J. COLEMAN, JR.	U OF CALIF, LA
O1 - F.V. CORONITI	U OF CALIF, LA
O1 - C.F. KENNEL	U OF CALIF, LA
O1 - R.L. MCPHERSON	U OF CALIF, LA
O1 - G.L. SISCOE	U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT USED A TRIAXIAL FLUXGATE MAGNETOMETER WITH TWO RING-CORE SENSORS AT THE END OF A MAGNETOMETER BOOM AND ONE RING-CORE SENSOR, AT 45 DEG TO THE SPIN AXIS, HALFWAY DOWN THE BOOM. THE DRIVE AND ELECTRONICS DESIGN HAD BEEN USED ON THE APOLLO 15 AND 16 SUBSATELLITES. THE OBJECTIVES WERE TO DETERMINE ANY PLANETARY AND REMANENT MAGNETIC FIELDS, TO DEDUCE THE LOCATION AND STRENGTH OF THE IONOSPHERIC CURRENT SYSTEM, TO DETERMINE THE ENERGY AND MASS BALANCE IN THE UPPER ATMOSPHERE OF VENUS, TO DETERMINE THE NATURE OF THE SOLAR WIND INTERACTION WITH VENUS, AND TO STUDY THE NEAR-WAKE REGION OF VENUS AND THE STRUCTURE OF THE VENUSIAN BOW SHOCK. INTERPLANETARY OBJECTIVES WERE TO DETERMINE THE PERTURBATION OF THE NEAR-PLANET REGION BY VENUS AND TO COMPARE THE PROPERTIES OF THE AVERAGE FIELD AT 0.7 AND 1.0 AU. THE INSTRUMENT WAS INTENDED TO, IN THE WORST CASE OF LOW-BIT AND LOW-SAMPLE RATES, MEASURE ONE VECTOR PER 32 S. WHILE IN VENUS ORBIT, WHEN THE SPACECRAFT WAS COASTING THROUGH THE INTERPLANETARY REGION IN THE APOPSIS MODE, THE SAMPLE RATE WAS ONE VECTOR PER 8 S. WHILE THE SPACECRAFT WAS PASSING THROUGH THE VENUSIAN IONOSPHERE IN THE PERIAPSIS MODE, THE SAMPLE RATE WAS FOUR VECTORS PER S.

----- PIONEER VENUS 1, SCARF-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- 78-051A-13

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
O1 - I.M. GREEN	TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A MODIFIED VERSION OF THE PIONEER 8 AND PIONEER 9 EXPERIMENTS TO MEASURE THE ELECTRIC-FIELD COMPONENTS IN FOUR 30-PERCENT, NARROW-BAND CHANNELS CENTERED AT 100, 730, 7350, AND 30,000 HZ. THE AIMS OF THE INVESTIGATION WERE TO PERFORM THE FIRST ANALYSIS OF VLF ELECTRIC FIELDS AT VENUS TO ELUCIDATE THE PLASMA INTERACTIONS BETWEEN THE SOLAR WIND AND THE IONOSPHERIC OR EROSHERIC PLASMA. THE ROLE OF PLASMA INSTABILITIES IN MODIFYING THE HEAT FLUX FROM THE SOLAR WIND AND IN THERMALIZING HEAVY BORN IONS FROM VENUS WAS ALSO STUDIED. A SELF-CONTAINED BALANCED V-TYPE ANTENNA WITH A DIFFERENTIAL PREAMPLIFIER WAS EMPLOYED TO MAKE THE MEASUREMENTS. AT THE 512-BPS SATELLITE MODE, ONE FREQUENCY SCAN PER S WAS OBTAINED.

----- PIONEER VENUS 1, SCHUBERT-----

INVESTIGATION NAME- PARTICIPATING THEONIST SCHUBERT

NSSDC ID- 78-051A-14

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
IONOSPHERES
MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
PLANETOLOGY
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - G. SCHUBERT	U OF CALIF, LA
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BRIEF DESCRIPTION

MEASUREMENTS OF PLASMA TEMPERATURES, MAGNETIC FIELDS, COMPOSITION, AND OTHER DATA WERE USED TO DEVELOP AND TEST THEORIES OF ATMOSPHERIC CIRCULATION AND SOLAR WIND-IONOSPHERE INTERACTIONS. IN THE CASE OF THE TOPOGRAPHY AND GRAVITY, THE DATA (ALTIMETRY AND TRACKING) WERE USED BOTH IN DESCRIPTIVE FASHION, TO SIMPLY CHARACTERIZE THE SURFACE OF VENUS AND ITS GRAVITATIONAL FIELD, AND IN A MORE QUANTITATIVE WAY TO MODEL THE INTERNAL STRUCTURE OF THE PLANET.

----- PIONEER VENUS 1, STEWART-----

INVESTIGATION NAME- PROGRAMMABLE ULTRAVIOLET SPECTROMETER

NSSDC ID- 78-051A-15

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
IONOSPHERES

PERSONNEL

PI - A.I. STEWART	U OF COLORADO
O1 - C.A. BARTH	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - G.E. THOMAS	U OF COLORADO
O1 - D. ANDERSON	NOAA-SEL

BRIEF DESCRIPTION

THIS INVESTIGATION USED A 125-MM CASSEGRAIN TELESCOPE ON A 125-MM EBERT-FASTIE SPECTROMETER WITH A PROGRAMMABLE GRATING DRIVE, AIRGLOW, SCATTERED SUNLIGHT, AND HYDROGEN LYMAN-ALPHA EMISSIONS WERE DETECTED IN THE THERMOSPHERE, MESOSPHERE, AND EROSHERE OF VENUS. THESE MEASUREMENTS WERE USED TO ESTABLISH AND MAP THE COMPOSITION, TEMPERATURE, AND PHOTOCHEMISTRY OF THE THERMOSPHERE AND IONOSPHERE, TO DETERMINE THE PRESSURE AT AND ABOVE THE VISIBLE CLOUD TOPS, AND TO ESTABLISH THE DISTRIBUTION AND ESCAPE RATE OF ATOMIC HYDROGEN. THE INSTRUMENT OPERATED IN THE 1100-3400 A REGION.

----- PIONEER VENUS 1, TAYLOR, JR.-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-051A-17

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.A. TAYLOR, JR.	NASA-GSFC
O1 - S.J. BAUER	NASA-GSFC
O1 - R.E. HARTLE	NASA-GSFC
O1 - H.C. BRINTON	NASA-GSFC
O1 - J.R. HERMAN	NASA-GSFC
O1 - T.M. DONAHUE	U OF MICHIGAN
O1 - P.A. CLOUTIER	RICE U
O1 - F.C. MICHEL	RICE U

BRIEF DESCRIPTION

THE COMPOSITION AND CONCENTRATION OF THERMAL POSITIVE IONS IN THE IONOSPHERE OF VENUS WERE DETERMINED AND INTERPRETED IN TERMS OF VERTICAL AND HORIZONTAL COMPONENTS. THE INSTRUMENT USED WAS A BENNETT RADIO-FREQUENCY MASS SPECTROMETER BASED ON THE DESIGN OF THOSE FLOWN ON OGO AND ATMOSPHERIC EXPLORER SATELLITES. A MASS RANGE OF 1 TO 60 U WAS COVERED WITH A VARIETY OF AUTOMATIC SCAN-SEARCH MODES AVAILABLE.

----- PIONEER VENUS 1, WOLFE-----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTOR

NSSDC ID- 78-051A-18

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.M. WOLFE	NASA-ARC
O1 - A. BARNES	NASA-ARC
O1 - H.W. COLLARD	NASA-ARC
O1 - D.D. MCKIBBIN	NASA-ARC
O1 - J.D. MIMALOV	NASA-ARC
O1 - R.C. WHITTEN	NASA-ARC
O1 - D.S. INTRILIGATOR	U OF SOUTHERN CALIF

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THE INSTRUMENT FOR THIS EXPERIMENT WAS A QUADRISPHERICAL ELECTROSTATIC ANALYZER (DETECTOR B OF PLASMA INSTRUMENT ON PIONEERS 10 AND 11), WITH FIVE CURRENT COLLECTORS AND ELECTROMETERS. THE ENERGY/CHARGE RANGE WAS 50-8000 (IONS) IN 32 STEPS AND 1-500 (ELECTRONS) IN 16 STEPS. THE ANGULAR RANGE COVERED WAS PLUS OR MINUS 25 DEG ELEVATION BY 360 DEG AZIMUTH, AND THE DETECTOR FIELD OF VIEW WAS 15 DEG TIMES 25 DEG OR 15 DEG TIMES 45 DEG, DEPENDING ON POSITION. THE LOGIC DESIGN WAS ESSENTIALLY THAT USED ON PIONEERS 8 AND 9. THE OBJECTIVES WERE TO MEASURE SOLAR WIND CONDITIONS OUTSIDE THE VENUSIAN BOW SHOCK, INSIDE THE MAGNETOSHEATH FLOW FIELD, AND TO STUDY THE IONOPAUSAL STRUCTURE. SOLAR-WIND MEASUREMENTS WERE MADE DURING THE TRANSIT TO VENUS, PARTICULARLY TO STUDY MACROSCALE PROBLEMS AND TO DETERMINE AVERAGE GRADIENTS. THE NEAR-PLANET WAKE REGION WAS ALSO AVAILABLE FOR STUDY.

***** PROGNOZ 8*****

SPACECRAFT COMMON NAME- PROGNOZ 8
ALTERNATE NAMES- 12116

NSSDC ID- 80-103A

LAUNCH DATE- 12/25/80 WEIGHT- 915. KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
U.S.S.R. SAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/25/80
ORBIT PERIOD- 5689. MIN INCLINATION- 65.8 DEG
PERIAPSIS- 980. KM ALT APOAPSIS- 197390. KM ALT

PERSONNEL
PS - A.A. GALEEV IKI

BRIEF DESCRIPTION

THIS SPACECRAFT WAS A MEMBER OF A CONTINUING SERIES TO MEASURE CHARGED PARTICLES, PLASMA, MAGNETIC FIELDS AND ELECTROMAGNETIC RADIATION. ALTHOUGH NO SPECIFIC INFORMATION HAS BEEN PROVIDED CONCERNING THE EXPERIMENTS AND THE SCIENTIFIC OBJECTIVES, IT IS LIKELY THEY ARE BOTH SIMILAR TO PROGNOZ 7. THE STUDY OF SOLAR UV, X-RAY, AND GAMMA-RAY EMISSIONS WAS CONTINUED ALONG WITH THE MONITORING OF ELECTRONS AND PROTONS IN INTERPLANETARY SPACE AND THE MAGNETOSPHERE. THE INVESTIGATION OF THE NUCLEAR COMPOSITIONS OF SOLAR AND GALACTIC COSMIC RAYS WAS CONTINUED ALONG THE MEASUREMENT OF IN-SITU MAGNETIC FIELDS. A REQUEST HAS BEEN MADE TO PROVIDE DESCRIPTIONS OF THE VARIOUS INSTRUMENTS BUT NO RESPONSE HAS BEEN RECEIVED. EXCEPT FOR THE SOLAR X-RAY EXPERIMENT WHICH WAS INDICATED TO BE THE SAME AS FLOWN ON PROGNOZ 7.

----- PROGNOZ 8, LICKIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 80-103A-01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - O.B. LICKIN IKI
PI - D. VALENICEK ASTRONOMICAL INST

BRIEF DESCRIPTION

TWO DETECTORS WERE USED TO RECORD SOLAR X RAYS IN THE ENERGY RANGE 2.2 TO 98 KEV. A NaI (TL) SCINTILLATION DETECTOR 3 MM THICK WITH 4.5 CM SQ AREA WAS USED FOR THE RANGE 6 TO 98 KEV. PULSE-AMPLITUDE ANALYSIS WAS DONE FOR 5 CONTIGUOUS ENERGY CHANNELS OVER THIS RANGE. AN ADDITIONAL ENERGY RANGE OF 2.2 TO 7 KEV WAS COVERED BY A GAS-FILLED, NE WINDOW PROPORTIONAL COUNTER, USING AMPLITUDE DISCRIMINATION. THE HIGH VOLTAGE TO THE GAS COUNTER WAS AUTOMATICALLY SWITCHED OFF BY A RATE-SENSITIVE DEVICE DURING PASSAGE THROUGH THE RADIATION BELTS, TO PROLONG THE LIFE OF THE DETECTOR. THE SAME INSTRUMENT WAS USED ON PROGNOZ 5, 6, AND 7.

***** SAGE*****

SPACECRAFT COMMON NAME- SAGE
ALTERNATE NAMES- AEM-B, STRAT AERO AND GAS EXP
APPL EXPL MISSION B, 11270

NSSDC ID- 79-013A

LAUNCH DATE- 02/18/79 WEIGHT- 148.7 KG
LAUNCH SITE- Wallops Flight Center, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.8 MIN
PERIAPSIS- 547.5 KM ALT

EPOCH DATE- 02/19/79
INCLINATION- 54.9 DEG
APOAPSIS- 660.2 KM ALT

PERSONNEL

MG - D.S. DILLER
SC - R.A. SCHIFFER
PM - C.W. MACKENZIE
PS - R.S. FRASER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) SPACECRAFT SERVED AS A SMALL, VERSATILE, LOW-COST PLATFORM CARRYING A SINGLE EXPERIMENT DESIGNED TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. THE SAGE OBTAINED AEROSOL AND OZONE INFORMATION BY MEASURING THE ATTENUATION OF SOLAR RADIATION BY THE EARTH'S ATMOSPHERE AT FOUR SEPARATE WAVELENGTHS.

----- SAGE, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS EXPERIMENT
(SAGE)

NSSDC ID- 79-013A-01

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

PI - M.P. MCCORMICK
OI - D.W. CUNNOLD
OI - G.W. GRAMS
OI - B.W. HERMAN
OI - D.E. MILLER
OI - D.G. MURCRAE
OI - T.J. PEPIN
OI - W.G. PLANET
OI - P.B. RUSSELL

NASA-LARC
GEORGIA INST OF TECH
GEORGIA INST OF TECH
U OF ARIZONA
METEOROLOGICAL OFFICE
U OF DENVER
U OF WYOMING
NOAA-NES
SRI INTERNATIONAL

BRIEF DESCRIPTION

THE OBJECTIVES OF THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) WERE TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. SPECIFIC OBJECTIVES WERE (1) TO DEVELOP A SATELLITE-BASED REMOTE-SENSING TECHNIQUE FOR STRATOSPHERIC AEROSOLS AND OZONE, (2) TO MAP AEROSOL AND OZONE CONCENTRATIONS ON A TIME SCALE SHORTER THAN MAJOR STRATOSPHERIC CHANGES, (3) TO LOCATE STRATOSPHERIC AEROSOL AND OZONE SOURCES AND SINKS, (4) TO MONITOR CIRCULATION AND TRANSFER PHENOMENA, (5) TO OBSERVE HEMISPHERE DIFFERENCES, AND (6) TO INVESTIGATE THE OPTICAL PROPERTIES OF AEROSOLS AND ASSESS THEIR EFFECTS ON GLOBAL CLIMATE. THE SAGE INSTRUMENT CONSISTED OF A GREGORIAN TELESCOPE AND A DETECTOR SUBASSEMBLY WHICH MEASURED THE ATTENUATION OF SOLAR RADIATION AT FOUR WAVELENGTHS (.38, .45, .6, AND 1.0 MICROMETERS) DURING SOLAR OCCULTATION. AS THE SPACECRAFT EMERGED FROM THE EARTH'S SHADOW, THE SENSOR SCANNED THE EARTH'S ATMOSPHERE FROM THE HORIZON UP, AND MEASURED THE ATTENUATION OF SOLAR RADIATION BY DIFFERENT ATMOSPHERIC LAYERS. THIS PROCEDURE WAS REPEATED DURING SPACECRAFT SUNSET. TWO VERTICAL SCANNINGS WERE OBTAINED DURING EACH ORBIT, WITH EACH SCAN REQUIRING APPROXIMATELY 1 MIN OF TIME TO COVER THE ATMOSPHERE ABOVE THE TROPOSPHERE. THE INSTRUMENT HAD A FIELD OF VIEW OF APPROXIMATELY 0.5 MIN OF ARC WHICH RESULTED IN A VERTICAL RESOLUTION OF LESS THAN 1 KM.

***** SMM*****

SPACECRAFT COMMON NAME- SMM
ALTERNATE NAMES- SOLAR MAXIMUM MISSION, 11703

NSSDC ID- 80-014A

LAUNCH DATE- 02/14/80 WEIGHT- 2315. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSG

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.12 MIN
PERIAPSIS- 571.5 KM ALT

EPOCH DATE- 02/15/80
INCLINATION- 28.5 DEG
APOAPSIS- 573.5 KM ALT

PERSONNEL

MG - M.E. McDONALD
SC - J.D. ROWLIN
PM - J.P. CORRIGAN
PS - R.J. FROST

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE SOLAR MAXIMUM MISSION (SMM) WAS DESIGNED TO PROVIDE COORDINATED OBSERVATIONS OF SOLAR ACTIVITY--SOLAR FLARES IN PARTICULAR--DURING A PERIOD OF MAXIMUM SOLAR ACTIVITY. IT CARRIED A PAYLOAD OF SEVEN INSTRUMENTS SPECIFICALLY SELECTED TO STUDY THE SHORT-WAVELENGTH AND CORONAL MANIFESTATIONS OF FLARES. THE PAYLOAD OBTAINED DATA ON THE STORAGE AND RELEASE OF FLARE ENERGY, PARTICLE ACCELERATION, FORMATION OF HOT PLASMA, AND MASS EJECTION. COMPLEMENTARY STUDIES WERE MADE AS PART OF THE SMM GUEST INVESTIGATOR PROGRAM, AND COORDINATED

IN-SITU MEASUREMENTS OF FLARE PARTICLE EMISSIONS WERE MADE FROM THE ISEE 3 SATELLITE. THE SMM OBSERVATORY WAS APPROXIMATELY 4 M IN LENGTH, FITTING INTO A CIRCULAR ENVELOPE 2.3 M IN DIAMETER. THE CONSTRUCTION WAS MODULAR. THE INSTRUMENT MODULE OCCUPIED THE TOP 2.3 M, AND CONTAINED ALL THE SOLAR PAYLOAD INSTRUMENTS, ALONG WITH THE FINE-POINTING, SUN-SENSOR SYSTEM. BELOW THE INSTRUMENT MODULE WAS THE MULTIMISSIION MODULAR SPACECRAFT (MMS) CONTAINING THE SYSTEMS FOR ATTITUDE CONTROL, POWER, AND COMMUNICATION AND DATA HANDLING. BETWEEN THE INSTRUMENT MODULE AND THE MMS WAS THE TRANSITION ADAPTOR, SUPPORTING TWO FIXED SOLAR PADDLES THAT SUPPLIED BETWEEN 1900 AND 3000 W OF POWER. QUICK AND COORDINATED RESPONSES TO SOLAR FLARES WERE CONSIDERED ESSENTIAL FOR MEETING THE SCIENTIFIC OBJECTIVES OF THE MISSION. THEREFORE, THE GROUND SYSTEM WAS DESIGNED TO FACILITATE COORDINATED DATA EVALUATION, OBSERVATION, PLANNING, AND COMMAND UPLINK TO THE ONBOARD STORED COMMAND PROCESSOR. ONBOARD COORDINATION OF RESPONSES TO A FLARE WAS PERFORMED IN REAL TIME. THE ATTITUDE-CONTROL SOFTWARE ALLOWED OBSERVATORY REPOINTINGS AND SLOW SCANNING MOTIONS, AND HAD A SPECIAL MODULE FOR TRACKING A SOLAR FEATURE OVER MANY DAYS.

----- SMM, ACTON-----

INVESTIGATION NAME- SOFT X-RAY POLYCHROMATOR (XRP)

NSSDC ID- 80-014A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - L.W. ACTON	LOCKHEED PALO ALTO
PI - A.M. GABRIEL	RUTHERFORD/APPLTON LAB
PI - J.L. CULHANE	U COLLEGE LONDON
OI - R.C. CATURA	LOCKHEED PALO ALTO
OI - J.M. PARKINSON	U COLLEGE LONDON
OI - C.G. RIPLEY	U COLLEGE LONDON
OI - M.B. JONES	RUTHERFORD/APPLTON LAB
OI - C. JORDAN	OXFORD U
OI - C.J. WOLFSON	LOCKHEED PALO ALTO
OI - W.C. FAWCETT	RUTHERFORD/APPLTON LAB

BRIEF DESCRIPTION

THE SOFT X-RAY POLYCHROMATOR (XRP) WAS A HIGH-RESOLUTION INSTRUMENT THAT COVERED THE SPECTRAL REGION FROM 0.14 NM TO 2.24 NM (1.4 - 22.4 Å). THIS AREA INCLUDED EMISSION LINES WHICH WERE IMPORTANT FOR THE DIAGNOSIS OF PLASMAS IN THE 1.5 - 50 MILLION DEG K TEMPERATURE RANGE, AN AREA ESPECIALLY USEFUL FOR SOLAR FLARE AND ACTIVE SOLAR REGION STUDIES. THE XRP CONSISTED OF TWO INSTRUMENTS WITH A COMMON CONTROL, DATA HANDLING AND POWER SYSTEM. THE BENT CRYSTAL SPECTROMETER (BCS) WAS DESIGNED FOR HIGH-TIME-RESOLUTION STUDIES IN THE LINES OF Fe I - Fe XXVI AND CA XIX. IT SIMULTANEOUSLY OBSERVED EIGHT FIXED-WAVELENGTH INTERVALS WITH A RELATIVELY LARGE FIELD OF VIEW (6 X 6 MIN FWHM). A PROGRAMMABLE MICROPROCESSOR CONTROLLED TRADEOFFS BETWEEN TEMPORAL AND SPECTRAL RESOLUTION THAT COULD PROVIDE AN ULTIMATE TEMPORAL RESOLUTION OF 0.064 S. THE FLAT CRYSTAL SCANNING SPECTROMETER (FCS) PROVIDED FOR 7-CHANNEL POLYCHROMATIC MAPPING OF FLARING AND OTHER ACTIVE REGIONS IN THE RESONANCE LINES OF O VIII, NE IX, MG XI, SI XIII, S XV, CA XIX AND FE XXIV WITH 14 ARC S SPATIAL RESOLUTION. IN ITS SPECTRAL SCANNING MODE IT COULD COVER THE ENTIRE 0.14-2.24 NM REGION IN ABOUT 7 S. THE FCS CONSISTED OF A FINELY COLLATED ARRAY OF FLAT-CRYSTAL SPECTROMETERS WITH A FIELD OF VIEW 14 X 14 ARC S THAT COULD BE RASTERED IN 5 S STEPS OVER ANY PORTION OF A TARGET 7 ARC MIN SQUARE. THE FCS PROVIDED GOOD SPATIAL AND SPECTRAL RESOLUTION AT SOME COST TO TEMPORAL RESOLUTION. ITS PROGRAMMABLE MICROPROCESSOR CONTROLLED THE OPERATION OF THE FCS'S MASTER AND CRYSTAL DRIVE MECHANISMS. FOR FURTHER INFORMATION SEE SOLAR PHYSICS, 65 (1980) 53-71.

----- SMM, CHUPP-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER (GRE)

NSSDC ID- 80-014A-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - E.L. CHUPP	U OF NEW HAMPSHIRE
OI - D.J. FORREST	U OF NEW HAMPSHIRE
OI - K. PINKAU	MPI-EXTRATERM PHYS
OI - C. BEPPIN	MPI-EXTRATERM PHYS
OI - E. RIEGER	MPI-EXTRATERM PHYS
OI - M.N. JOHNSON	US NAVAL RESEARCH LAB
OI - R.L. KINZER	US NAVAL RESEARCH LAB
OI - J.D. KURTSS	US NAVAL RESEARCH LAB
OI - G.M. SHARE	US NAVAL RESEARCH LAB
OI - A.S. JACOBSON	NASA-JPL

BRIEF DESCRIPTION

THIS INVESTIGATION UTILIZED A SET OF NAI (TL) DETECTORS AND CSI (NA) DETECTORS TO FORM THREE SEPARATE INSTRUMENTS FOR MEASUREMENT OF THE SOLAR GAMMA-RAY SPECTRUM: (1) AN ACTIVELY SHIELDED, MULTICRYSTAL GAMMA-RAY SPECTROMETER, (2) A HIGH-ENERGY GAMMA-RAY DETECTOR, AND (3) AN AUXILIARY X-RAY DETECTOR. THE HEART OF THE GAMMA-RAY SPECTROMETER CONSISTED OF SEVEN 7.6-CM X 7.6-CM NAI INTEGRAL LINE DETECTORS SHIELDED BY AN ANNULUS OF CSI AND A 7.6-CM THICK CSI BACK. THE FRONT AND BACK OF THIS SYSTEM WAS SHIELDED BY A PLASTIC SCINTILLATOR TO REJECT CHARGED PARTICLES. THE SPECTROMETER PRODUCED A 476-CHANNEL, PULSE-HEIGHT SPECTRUM EVERY 16 S OVER THE ENERGY RANGE 0.3 - 9 MEV. THE ENERGY RESOLUTION WAS LESS THAN 7 PERCENT FWHM AT 0.662 MEV. A 2-S TIME RESOLUTION WAS AVAILABLE IN THREE WINDOWS TO STUDY PROMPT LINE EMISSION AT 4.4 AND 6.1 MEV; PHOTONS FROM 0.3 - 0.35 MEV WERE RECORDED WITH A 64-MS RESOLUTION. THE HIGH-ENERGY DETECTOR CONSISTED OF THE SEVEN NAI FRONT DETECTORS OF THE GAMMA-RAY SPECTROMETER AND THE LARGE 25-CM DIAMETER BY 7.6-CM CSI BACK DETECTOR. EVENTS IN THE 10 - 100 MEV RANGE OCCURRING IN THIS TOTAL DETECTOR MASS WERE ANALYZED BY SEPARATE PULSE HEIGHT ANALYZERS. NEUTRONS ABOVE 20 MEV COULD BE DISTINGUISHED BY A DIFFERENCE IN SIGNATURE AND IN TIME OF FLIGHT FROM THE SOLAR SURFACE. THE HIGH-ENERGY SYSTEM HAD A 2-S TIME RESOLUTION. THE AUXILIARY X-RAY DETECTOR CONSISTED OF TWO 0.6-CM-THICK NAI DETECTORS, ONE WITH AN AL FILTER TO COVER THE 10-80 KEV RANGE AND THE OTHER WITH AN AL-FE FILTER TO COVER THE 25 - 140 KEV RANGE. THE X-RAY SYSTEM HAD A TIME RESOLUTION OF 1 S AND 4 CHANNELS OF ENERGY. FOR MORE DETAILS ON THIS EXPERIMENT THE ARTICLE BY FORREST ET AL., SOLAR PHYSICS, VOL. 65, FEB. 1980, PP 15-23 SHOULD BE CONSULTED.

----- SMM, DE JAGER-----

INVESTIGATION NAME- HARD X-RAY IMAGING SPECTROMETER (HIS)

NSSDC ID- 80-014A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - C. DE JAGER	U OF UTRECHT
OI - H.F. VAN BEEK	SPACE RESEARCH LAB
OI - A.P. WILLMORE	U OF BIRMINGHAM

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO MEASURE THE POSITION, STRUCTURE, AND THERMODYNAMIC PROPERTIES OF HOT THERMAL AND NON-THERMAL SOURCES IN ACTIVE REGIONS AND FLARES. THIS INSTRUMENT PRODUCED TWO-DIMENSIONAL IMAGES WITH 8-ARC-S RESOLUTION OVER AN APPROXIMATELY SQUARE AREA OF 2 MIN 40 S PER SIDE, OR 32-ARC-S RESOLUTION OVER A 6-MIN 24-S BY 6-MIN 24-S AREA. THESE IMAGES WERE OBSERVED IN SIX SELECTABLE ENERGY CHANNELS BETWEEN 3.5 AND 30 KEV, AND WITH A TEMPORAL RESOLUTION OF 0.5-7 S, DEPENDING ON THE MODE OF OPERATION. BY MEANS OF A FLARE FLAG, THE EXPERIMENT ALERTED OTHER SMM INSTRUMENTS WHEN A FLARE BEGAN AND INDICATED THE POSITION OF THE BRIGHTEST PIXEL OF THE OBSERVATION. THE INSTRUMENT CONSISTED OF 10 ETCHED GRID PLATES, EACH DIVIDED INTO 576 SECTIONS THAT FORMED THE COLLIMATOR AND 980 MINI-PROPORTIONAL COUNTERS THAT PROVIDED A POSITION-SENSITIVE DETECTOR SYSTEM THAT WAS CAPABLE OF SPECTRAL ANALYSIS. A DUAL MICROCOMPUTER SYSTEM PERMITTED THREE MODES OF OPERATION WITH COMMANDABLE PARAMETERS THAT PROVIDED FOR A FLEXIBLE TRADE-OFF BETWEEN TEMPORAL RESOLUTION AND SPATIAL COVERAGE DURING DIFFERENT PHASES OF A SOLAR FLARE. FOR MORE DETAILS ON THIS EXPERIMENT THE ARTICLE BY VAN BEEK ET AL., SOLAR PHYSICS, VOL. 65, FEB. 1980, PP 39-53 SHOULD BE CONSULTED.

----- SMM, FROST-----

INVESTIGATION NAME- HARD X-RAY BURST SPECTROMETER (HXRBS)

NSSDC ID- 80-014A-06

INVESTIGATIVE PROGRAM
CODE S1

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - K.J. FROST	NASA-GSFC
OI - L.E. ORWIG	NASA-GSFC
OI - B.R. DENNIS	NASA-GSFC
OI - T.L. CLINE	NASA-GSFC
OI - W.D. DESAI	NASA-GSFC

BRIEF DESCRIPTION

THE INVESTIGATION WAS CONCERNED WITH IMPULSIVE FLARE EMISSION TO DETERMINE THE ROLE THAT ENERGETIC ELECTRONS PLAY IN SOLAR FLARE MECHANISMS. THE INSTRUMENT CONSISTED OF A DISK-SHAPED CSI (NA) CENTRAL DETECTOR AND A CSI (NA) ACTIVE COLLIMATOR ELEMENT THAT SURROUNDED THE CENTRAL DETECTOR. PHOTOMULTIPLIER (PM) TUBES WERE USED TO VIEW THE CRYSTALS. THE CENTRAL CRYSTAL WAS 0.635 CM THICK WITH A SENSITIVE AREA OF 71 CM. THE COLLIMATOR PROVIDED A 40 DEG FWHM FIELD OF VIEW. THE ENERGY RANGE 20 - 240 KEV WAS COVERED BY 15 ENERGY-LOSS CHANNELS THAT PROVIDED CONTINUOUS MEASUREMENTS WITH A TIME RESOLUTION OF 128 MS. THE SYSTEM POSSESSED AN ENERGY RESOLUTION OF 30 PERCENT FWHM AT 122 KEV. BY USE OF A CIRCULATING 32K WORD MEMORY, TIME RESOLUTIONS AS SHORT AS 1 MS WERE OBTAINED FOR FAST-RISING BURSTS, BUT NO SPECTRAL DATA WERE

AVAILABLE WITH THIS MEMORY. EITHER A CONSTANT TIME (CT) OR CONSTANT COUNT (CC) MODE FOR THE MEMORY COULD BE SELECTED. USING THE CT MODE DURING SOLAR OBSERVING PERIODS, 10 NS RESOLUTION OF ANY FLARE OUTPUT THAT TRIGGERED THE DEVICE COULD BE OBTAINED. USING THE CC MODE DURING SPACECRAFT NIGHT, GAMMA-RAY BURSTS COULD BE DETECTED EFFECTIVELY. A CHARGED PARTICLE DETECTOR WAS USED TO SENSE THE SOUTH ATLANTIC ANOMALY REGION AND TURN OFF THE VOLTAGE TO THE PM TUBES. FOR MORE DETAILED INFORMATION ABOUT THIS EXPERIMENT SEE ORWIG ET AL, SOLAR PHYSICS, VOL. 65, FEB. 1988, PP 27-37.

----- SMM, HOUSE-----

INVESTIGATION NAME- CORONAGRAPH/POLARIMETER

NSSDC ID- 88-014A-01

INVESTIGATIVE PROGRAM
CODE 57/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - L.L. HOUSE	HIGH ALTITUDE OBS
O1 - M.J. WAGNER	HIGH ALTITUDE OBS
O1 - E.G. MCLONER	HIGH ALTITUDE OBS
O1 - G.A. BULK	U OF COLORADO
O1 - C.B. SAWYER	HIGH ALTITUDE OBS
O1 - R. KOPP	LOS ALAMOS SCI LAB
O1 - G.W. PNEUMAN	HIGH ALTITUDE OBS
O1 - C.W. BUERFELD	HIGH ALTITUDE OBS
O1 - M.U. SCHMIDT	MPI-PHYS ASTROPHYS
O1 - K.V. SHERIDAN	CSIRO,DIV OF RADIOPHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS EXPERIMENT WAS TO MEASURE THE RESPONSE OF THE ELECTRON DENSITY AND MAGNETIC FIELD STRUCTURE OF THE CORONA TO THE PASSAGE OF TRANSIENT PHENOMENA ON RAPID TIME SCALES. THE SECONDARY OBJECTIVE WAS TO DETERMINE THE DENSITY AND ORIENTATION OF THE MAGNETIC FIELD STRUCTURE OF THE CORONA ON A SYNCTIC BASIS. THE CORONAGRAPH/POLARIMETER (C/P) WAS THE MOST RECENT VERSION OF A SPACEBORNE EXTERNALLY OCCULTED LYOT CORONAGRAPH DESIGNED TO PRODUCE IMAGES OF THE SOLAR CORONA IN SEVEN WAVELENGTH BANDS IN THE VISUAL SPECTRAL RANGE. THE C/P WAS OCCULTED BY THREE DISKS, WITH A 2.6 CM DIAMETER PRIMARY OBJECTIVE LENS, OF AIR-SPACED DOUBLET DESIGN. CORONAL QUADRANTS WERE IMAGED AT F/34 ON A RESHLESS VIDICON WITH A ROTATING MIRROR ARRANGEMENT AND WERE RECORDED ON A DEDICATED TAPE RECORDER FOR SUBSEQUENT TRANSMISSION TO THE EARTH. FIELDS OF VIEW RANGED FROM 1.5 TO 6.0 50 SOLAR RADII AND WERE SELECTABLE WITHIN THE CORONAL QUADRANT. SPATIAL RESOLUTION WAS SELECTABLE BETWEEN 6.4 AND 12.8 ARC S. SEVEN FILTERS WERE AVAILABLE WITHIN THE RANGE 446.5 NM TO 650.3 NM (4465 - 6503 A) AND POLARIZATION WAS MEASURED BY A SEQUENCE OF THREE POLARIZERS ORIENTED 60 DEG APART (A CLEAR POSITION WAS ALSO AVAILABLE). THE STRAY RADIANCE WAS ABOUT 3.E-10 OF THE SOLAR BRIGHTNESS IN THE OUTER FIELD. THE INSTRUMENT WAS ON AN INDEPENDENT GIMBAL MOUNT AND WAS SUN-CENTERED TO WITHIN 10 ARC S. EXPERIMENTS WITH THE C/P INVOLVED EITHER RADIANCE OBSERVATIONS OR POLARIZATION SEQUENCES. FOR FURTHER INFORMATION SEE SOLAR PHYSICS, 65 (1988) 91-107.

----- SMM, TANDBERG-MANSEN-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER AND POLARIMETER

NSSDC ID- 88-014A-02

INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ATMOSPHERIC PHYSICS
ASTRONOMY

PERSONNEL

PI - E. TANDBERG-MANSEN	NASA-MSFC
O1 - R.G. ATHAY	HIGH ALTITUDE OBS
O1 - J.M. BECKERS	SACRAMENTO PEAK OBS
O1 - J.C. BRANDT	NASA-GSFC
O1 - E.C. BRUNER, JR.	LOCKHEED PALO ALTO
O1 - R.D. CHAPMAN	NASA-GSFC
O1 - D.E. WOODGATE	NASA-GSFC

BRIEF DESCRIPTION

THE ULTRAVIOLET SPECTROMETER AND POLARIMETER (USVP) WAS A MODIFIED VERSION OF THE TELESCOPE-SPECTROGRAPH SYSTEM FLOWN ON OSO 8. THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY SOLAR ULTRAVIOLET RADIATION FROM ACTIVE REGIONS, FLARES, PROMINENCES, AND THE CORONA IN ORDER TO DETERMINE TEMPERATURE, DENSITY, VELOCITY, AND THE MAGNETIC FIELD IN THE SOLAR PLASMA. A SECONDARY OBJECTIVE WAS TO CONDUCT AN AERONOMY PROGRAM TO MEASURE THE HEIGHT DISTRIBUTION OF MAJOR ABSORBERS IN THE EARTH'S ATMOSPHERE, SUCH AS OZONE AND OXYGEN, AND TO DETECT TRACE CONSTITUENTS AND THEIR CHANGES AS A RESULT OF SOLAR FLARES. THE INSTRUMENT CONSISTED OF A GREGORIAN TELESCOPE AND AN EBERT SPECTROMETER. THE TELESCOPE HAD AN EFFECTIVE FOCAL LENGTH OF 1.8 M, A COLLECTING AREA OF 66.4 50 CM, AND A FIELD OF VIEW 254 X 256 ARC S 50. THE SECONDARY MIRROR HAD A RASTER MECHANISM THAT ALLOWED UP TO A 256- X 256-ARC S SCAN RANGE. SPATIAL RESOLUTION WAS DETERMINED BY AN ENTRANCE SLIT MECHANISM THAT WAS ADJUSTABLE FROM 1 X 1 ARC S TO 30 X 30 ARC S. A CHOICE OF 22 ENTRANCE/EXIT SLIT COMBINATIONS WAS AVAILABLE. THE EBERT SPECTROMETER HAD A SPECTRAL RANGE OF 175 - 360

NM(1750 - 3600 A) WITH A RESOLUTION OF 0.004 NM(0.04 A) FWHM IN THE FIRST ORDER AND 115 - 100 NM(1150 - 1000 A) WITH A RESOLUTION OF 0.002 NM(0.02 A) FWHM IN THE SECOND ORDER. THE POLARIMETER WAS LOCATED BEHIND THE ENTRANCE SLIT AND CONSISTED OF TWO RETARDERS (WAVEPLATES), A LINEAR POLARIZER, AND DRIVE MECHANISMS. THE CONTROL ELECTRONICS FOR THE INSTRUMENT INCLUDED A PROGRAMMABLE MICROPROCESSOR. SIMULTANEOUS MEASUREMENTS AT DIFFERENT HEIGHTS IN THE CHROMOSPHERE AND CORONA COULD BE MADE BY SELECTING ANY OF THREE SETS OF FOUR LINE PAIRS FOR SPECTROSCOPY AND ANY OF SIX LINE PAIRS FOR POLARIMETRY. FOR FURTHER INFORMATION SEE SOLAR PHYSICS, 65 (1988) 73-90.

----- SMM, WILLSON-----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR

NSSDC ID- 88-014A-03

INVESTIGATIVE PROGRAM
CODE 57

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - R.C. WILLSON	NASA-JPL
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BRIEF DESCRIPTION

THE OBJECTIVE OF THE ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR (ACRIM) WAS TO MEASURE THE TOTAL SOLAR IRRADIANCE WITH STATE-OF-THE-ART ACCURACY AND PRECISION (I.E. 0.5 PERCENT) TO DETERMINE THE MAGNITUDE AND DIRECTION OF VARIATIONS IN THE TOTAL SOLAR OUTPUT OF OPTICAL ENERGY. SOLAR IRRADIANCE IN THE FAR ULTRAVIOLET WAVELENGTHS WAS MEASURED BY THREE ACTIVE CAVITY RADIOMETER DETECTORS INDIVIDUALLY SHUTTERED. THESE DETECTORS WERE ELECTRICALLY SELF-CALIBRATED, CONICAL CAVITY PYROMETERES, CAPABLE OF DEFINING THE SOLAR FLUX WITH AN UNCERTAINTY OF 0.1 PERCENT AND A PRECISION OF 0.2 PERCENT. ONE DETECTOR WAS USED ROUTINELY TO MONITOR THE SUN, A SECOND DETECTOR WAS INTERMITTENTLY EXPOSED TO THE SUN TO ESTABLISH THE LONG-TERM STABILITY OF THE FIRST DETECTOR, AND THE THIRD DETECTOR WAS USED FOR RESOLVING AMBIGUITIES IN THE PERFORMANCE OF THE FIRST TWO DETECTORS.

***** SMS 1*****

SPACECRAFT COMMON NAME- SMS 1
ALTERNATE NAMES- SMS-A, SYNCH METEOROL SATELL A
AEROS, REG1

NSSDC ID- 74-033A

LAUNCH DATE- 05/17/74	WEIGHT- 227. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES	
LAUNCH VEHICLE- DELTA	

SPONSORING COUNTRY/AGENCY

UNITED STATES	NOAA-NESS
UNITED STATES	NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 05/23/74
ORBIT PERIOD- 1340.4 MIN	INCLINATION- 1.9 DEG
PERIAPSIS- 32345.0 KM ALT	APOAPSIS- 35039.0 KM ALT

PERSONNEL

PM - T.J. KARRAS	NOAA-NESS
PS - W.E. SHERR	NASA-GSFC

BRIEF DESCRIPTION

THE SMS 1 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISR) WHICH PROVIDED HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND MADE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM. (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WHICH RELAYED PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND COLLECTED AND RETRANSMITTED DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENTAL MONITOR (SEM) WHICH MEASURED PHOTON, ELECTRON, AND SOLAR R-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAMETER AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND A THRUST TUBE. THE VISR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATION-KEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT.

----- SMS 1, NESS STAFF -----

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)

NESSDC ID- 74-033A-01 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
01 - W.E. SHERK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.78 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY SHAPED SCAN MIRROR AND COLLECTED BY A RITCHY-CRÉTIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL TO THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAZIR ANGLE. A MERCURY-CADMIUM TELLURIIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAZIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 100 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 DEG K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WALLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD. LIMITED AMOUNTS OF RESEARCH-ORIENTED DATA WERE COLLECTED BY NASA AND ARE MAINTAINED AT NESSDC.

----- SMS 1, NESS STAFF -----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NESSDC ID- 74-033A-05 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
01 - W.E. SHERK NASA-GSFC

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED, EARTH-BASED, DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAR TYPE) DATA TO EXISTING SMALL GROUND-BASED APT RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THIS COMMUNICATIONS SYSTEM OPERATED ON 5-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMS CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- SMS 1, WILLIAMS -----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NESSDC ID- 74-033A-02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-IRL
01 - R.W. GRUBB NOAA-ERL
01 - M.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE/ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURED ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 1, WILLIAMS -----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NESSDC ID- 74-033A-03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-IRL
01 - R.W. GRUBB NOAA-ERL
01 - R.F. DUNNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS, AND HAD A 1.27-E-4M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH NEON AT 1.5 TO 2 ATM AND HAD A 1.27 E-3 M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5- TO 3-A.

----- SMS 1, WILLIAMS -----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NESSDC ID- 74-033A-04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-IRL

BRIEF DESCRIPTION

A SERIAL, SHORT-BOOM-MOUNTED (2 FT) CLOSED-LOOP, FLURGATE MAGNETOMETER WAS ORIENTED WITH ONE AXIS ALONG THE S/C SPIN AXIS, AND ONE IN THE SPIN PLANE. EACH SENSOR HAD A SELECTABLE RANGE (-50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** SMS 2 *****

SPACECRAFT COMMON NAME- SMS 2
ALTERNATE NAMES- PL-7516, SYNCH METEOROL SATELL 8
SMS-0, MEO2

NESSDC ID- 75-011A

LAUNCH DATE- 02/06/75 WEIGHT- 243. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-GSFC

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC .POCH DATE- 04/01/75
ORBIT PERIOD- 1436.2 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 35770. KM ALT APOAPSIS- 35709. KM ALT

PERSONNEL
PM - T.J. KARRAS NOAA-NESS
PS - W.E. SHERK NASA-GSFC

BRIEF DESCRIPTION

THE SMS 2, A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT, CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTE EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS, AND CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH.

EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMB EQUIPMENT SHELL AND A THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELL AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE S/R EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WAS MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. BOTH UHF-BAND AND S-BAND FREQUENCIES WERE USED IN THE TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH, AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM AFTER THE SYNCHRONOUS ORBIT WAS ATTAINED.

----- SMS 2, NESS STAFF-----

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 75-011A-04 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 2 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY SHAPED SCAN MIRROR AND COLLECTED BY A RITCHY-CRATIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAZIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAZIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 100 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 DEG K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WILLOPS ISLAND, VA. THERE, THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA WERE HANDLED BY NOAA, AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD. LIMITED AMOUNTS OF RESEARCH-ORIENTED DATA WERE COLLECTED BY NASA AND WERE MAINTAINED AT NSSDC.

----- SMS 2, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-011A-05 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM, AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM OPERATING ON S-BAND FREQUENCIES, RECEIVED AND PROCESSED METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (OCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 OCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (UHF/FM TYPE) DATA TO EXISTING SMALL GROUND-BASED APT RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THE MINIMUM DATA COLLECTION FOR ONE SPACECRAFT CONSISTED OF APPROXIMATELY 3500 OCP STATIONS CONTACTED IN 6 H. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6 H WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING

TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT THE OCP STATION.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-011A-01 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.N. GRUBB NOAA-ERL
OI - H.M. SAUER NOAA-ERL

BRIEF DESCRIPTION
A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS: SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURED ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-011A-02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.N. GRUBB NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION
THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR. THE COLLIMATOR, MOUNTED SO ITS AXIS DECLINATION WAS CONTROLLED BY GROUND COMMAND, VIEWED THE SUN ONCE EVERY VEHICLE ROTATION. ONE ION CHAMBER, FILLED WITH ARGON AT 1 ATM, DETECTED 1- TO 2-A X RAYS, AND HAD A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27E-3 M BERYLLIUM WINDOW TO MEASURE X RAYS OF 0.5 TO 3 A.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 75-011A-03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.N. GRUBB NOAA-ERL
OI - J.C. JOSELYN NOAA-ERL

BRIEF DESCRIPTION
A SHORT-BOOM-DEPLOYED (6.61 M) TRIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH ONE SENSOR ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS MEASURED THE VECTOR MAGNETIC FIELD. THERE WAS A SELECTABLE RANGE (+50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN INSTANT CALIBRATION CAPABILITY.

***** STP P7B-1*****

SPACECRAFT (COMMON NAME- STP P7B-1)
ALTERNATE NAMES- SPACE TEST PROGRAM P7B-1, P7B-1
1127A, SOLWIND
SOLWIND

NSSDC ID- 70-017A

LAUNCH DATE- 02/24/79 WEIGHT 849.6 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.3 MIN
PERIAPSIS- 560. KM ALT

EPOCH DATE- 02/24/79
INCLINATION- 97.9 DEG
APOAPSIS- 600. KM ALT

PERSONNEL
PM - R.B. KEHL
PS - J.R. STEVENS

USAF SPACE DIVISION
AEROSPACE CORP

BRIEF DESCRIPTION

THE SPACE TEST PROGRAM (STP) P78-1 MISSION WAS DESIGNED TO OBTAIN SCIENTIFIC DATA FROM EARTH AND SUN-ORIENTED EXPERIMENTS. THE SPACECRAFT WAS SUN-ORIENTED AND HAD ITS SPIN AXIS PERPENDICULAR TO THE ORBIT PLANE AND THE SATELLITE-SUN LINE. THE INSTRUMENTATION CONSISTED OF (1) A GAMMA-RAY SPECTROMETER AND PARTICLE DETECTORS, (2) A WHITE-LIGHT CORONAGRAPH AND AN EXTREME-ULTRAVIOLET (XUV) HELIOGRAPH, (3) SOLAR X-RAY SPECTROMETER AND SPECTROHELIOGRAPH, (4) AN EXTREME-ULTRAVIOLET (XUV) SPECTROMETER, (5) A HIGH-LATITUDE PARTICLE SPECTROMETER, (6) AN X-RAY MONITOR, AND (7) A PRELIMINARY AEROSOL MONITOR.

----- STP P78-1, BOWYER-----
INVESTIGATION NAME- EXTREME ULTRAVIOLET SPECTROMETER

NSSDC ID- 79-017A-04

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH

PERSONNEL
PI - C.S. BOWYER

U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS INVESTIGATION USED AN EXTREME ULTRAVIOLET (EUV) SPECTROMETER TO MEASURE AIRGLOW RADIATION IN THE UPPER ATMOSPHERE. THE INSTRUMENT HAD A 6-DEG BY 6-DEG FIELD OF VIEW AND COULD MEASURE A SELECTED 600-A BANDWIDTH WITH 5-A RESOLUTION WITHIN THE 200 - 1400 A RANGE.

----- STP P78-1, IMHOF-----
INVESTIGATION NAME- GAMMA RAY SPECTROMETER

NSSDC ID- 79-017A-01

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - W.L. IMHOF

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INVESTIGATION USED GAMMA-RAY SPECTROMETERS TO MEASURE THE DISTRIBUTION OF GAMMA-RAY SOURCES AND THE CHARACTERISTICS OF ENERGETIC PARTICLE FLUXES AT LOW ALTITUDES. THE INSTRUMENT CONSISTED OF THREE DIFFERENT TYPES OF DETECTORS. THERE WERE TWO GE DETECTORS, COOLED BY A MECHANICAL REFRIGERATOR, TWO CsI/PLASTIC PHOSWICH DETECTORS, AND AN ARRAY OF EIGHT CD TE DETECTORS. EACH GE DETECTOR HAD A CONICAL FIELD OF VIEW (FOV) OF 45 DEG HALF ANGLE, WAS 80 CUBIC CM IN VOLUME AND 15 SQ CM IN FRONT AREA, AND MEASURED ENERGY LOSS FROM 40 KEV TO 2.5 MEV IN 4096 CHANNELS. A FACTOR-OF-3 GAIN CHANGE ALLOWED THE RANGE TO CHANGE TO 0.12 TO 7.5 MEV. THE INITIAL ENERGY RESOLUTION WAS 3.5 KEV AT 1 MEV, BUT, DUE TO RADIATION DAMAGE AND TEMPERATURE CYCLING CAUSED BY THE NECESSITY TO TURN OFF THE REFRIGERATOR FOR POWER CONSERVATION, THE RESOLUTION DEGRADED TO ABOUT 40 KEV AT THE 0.511-MEV LINE. THE PHOSWICH DETECTORS WERE 10.16-CM (4-IN.) DIAMETER DISKS OF 1.27 CM (0.5 IN.) THICKNESS; THEY MEASURED ENERGY LOSS FROM 40 KEV TO 2.5 MEV IN 256 CHANNELS. THE CD TE DETECTORS HAD A FAN-SHAPED FOV OF 90 DEG BY 10 DEG AND WERE EQUALLY SPACED IN THE 10-DEG WIDTHS AROUND THE CIRCLE. THE ENERGY LOSS RANGE WAS 20 - 200 KEV IN SIX CHANNELS.

----- STP P78-1, LANDECKER-----
INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 79-017A-03

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - P.P. LANDECKER
PI - R.W. KREPLIN
OI - D.L. MCKENZIE
OI - G.A. DOSCHER

AEROSPACE CORP
US NAVAL RESEARCH LAB
AEROSPACE CORP
US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INVESTIGATION WAS COMPOSED OF FOUR PARTS: SOLEX, SOLFLEX, MONEX, AND MACMAP. THE OBJECTIVE OF THESE FOUR EXPERIMENTS WAS THE STUDY OF SOLAR FLARES AND ACTIVE REGIONS. SOLEX OBTAINED SPECTRA IN THE 3- TO 25-A WAVELENGTH INTERVAL WHILE POINTED AT A SPECIFIC SOLAR REGION, AS WELL AS MAPS OF THE SUN IN INDIVIDUAL X-RAY SPECTRAL LINES USING MULTIGRAPH COLLIMATORS AND BRAGG CRYSTAL SPECTROMETERS. SOLFLEX OBTAINED FLARE SPECTRA IN FOUR NARROW WAVELENGTH BANDS BETWEEN 1.8 AND

8.6 A USING UNCOLLIMATED BRAGG CRYSTAL SPECTROMETERS. MONEX RECORDED FULL SOLAR-DISK INTENSITY WITH 32 MSEC TIME RESOLUTION FROM 0.1 TO 12 A USING UNCOLLIMATED PROPORTIONAL COUNTERS. MACMAP OBTAINED FULL-DISK SOLAR MAPS FROM 8 TO 12 A USING FILTERED COLLIMATED PROPORTIONAL COUNTERS.

----- STP P78-1, MICHELS-----

INVESTIGATION NAME- SOLAR WIND MONITOR

NSSDC ID- 79-017A-02

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - D.J. MICHELS

US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED A WHITE-LIGHT CORONAGRAPH AND AN EXTREME ULTRAVIOLET (EUV) HELIOGRAPH TO MONITOR THE SUN'S INNER AND OUTER CORONA. THE PURPOSE OF THE INVESTIGATION WAS TO DETERMINE THE CHARACTER OF THE PLASMA OUTFLOW AT THE SOURCE OF THE SOLAR WIND. THE INVESTIGATION ALSO MEASURED THE FORM AND STRUCTURE OF SOLAR FLARES, CORONAL HOLES, AND ALFVEN WAVES. DUE TO BACKGROUND LIGHT PROBLEMS, THE EUV HELIOGRAPH DATA WAS COMPLETELY COMPROMISED.

----- STP P78-1, PEPIN-----

INVESTIGATION NAME- PRELIMINARY AEROSOL MONITOR

NSSDC ID- 79-017A-07

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T.J. PEPIN

U OF WYOMING

BRIEF DESCRIPTION

THIS INVESTIGATION USED AN AEROSOL-MONITORING INSTRUMENT TO MEASURE THE CONCENTRATION AND VERTICAL DISTRIBUTION OF AEROSOLS AND OZONE IN THE EARTH'S STRATOSPHERE.

----- STP P78-1, SHULMAN-----

INVESTIGATION NAME- X-RAY MONITOR

NSSDC ID- 79-017A-06

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S.D. SHULMAN

US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED AN X-RAY MONITOR TO DETERMINE THE FREQUENCY AND LOCATION OF SHORT-LIVED X-RAY BURSTS FROM SPACE. IT PROVIDED A LOW-RESOLUTION MAPPING CAPABILITY FOR AURORAL X-RAY EMISSION.

----- STP P78-1, VANCOUR-----

INVESTIGATION NAME- HIGH LATITUDE PARTICLE SPECTROMETER

NSSDC ID- 79-017A-05

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - R.P. VANCOUR

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED TWO SETS OF DUAL ELECTROSTATIC ANALYZERS AT RIGHT ANGLES TO ACQUIRE ELECTRON DATA IN HIGH-LATITUDE AURORAL ZONES, PRIMARILY DURING MAGNETIC STORM AND SUBSTORM PERIODS. ONE ANALYZER IN EACH SET SWEEPED THROUGH THE ENERGY RANGE 50 - 1000 EV, WHILE THE OTHER ANALYZER SWEEPED FROM 1 TO 20 KEV SIMULTANEOUSLY. THE TOTAL ENERGY RANGE 0.05 - 20 KEV WAS DIVIDED INTO 16 CHANNELS.

***** STP P78-2*****

SPACECRAFT COMMON NAME- STP P78-2
ALTERNATE NAMES- SESP P78-2A, P78-2
SCATHA, 11256

NSSDC ID- 79-007A

LAUNCH DATE- 01/30/79 WEIGHT- 343. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/24/79
ORBIT PERIOD- 1416.2 MIN INCLINATION- 7.7 DEG
PERIAPSIS- 27593. KM ALT APOAPSIS- 43239. KM ALT

PERSONNEL
PI - R.B. KEHL USAF SPACE DIVISION

BRIEF DESCRIPTION

SPACECRAFT CHARGING AT HIGH ALTITUDES (SCATHA) WAS A SATELLITE PROGRAM FOR MEASURING THE CHARACTERISTICS OF THE PLASMASHEATH CHARGE-TO-PROCESS. THIS PROGRAM DETERMINED THE RESPONSE OF THE SATELLITE TO THE CHARGING AND EVALUATED THE TECHNIQUES TO CORRECT THE PROBLEM. THE SPACECRAFT WAS ESSENTIALLY A RIGID CIRCULAR CYLINDER, 1.7 M IN DIAMETER AND 1.8 M HIGH. IT HAD A NEAR-SYNCHRONOUS ORBIT AND SPUN ABOUT THE CYLINDER AXIS AT A RATE OF 1 RPM. THE SPIN VECTOR WAS NORMAL TO THE EARTH-SUN LINE AND IN THE EQUATORIAL PLANE OF THE EARTH. THERE WERE THREE 3-M BOOMS, A 2-M, AND A 7-M BOOM, ALL FOR DEPLOYMENT OF EXPERIMENTS. IN ADDITION, THERE WAS A 100-M TIP-TO-TIP ELECTRIC FIELD ANTENNA. TELEMETRY CAPABILITY WAS BOTH PCM AND FM, AND DATA COULD BE STORED UP TO 12 HOURS USING ON-BOARD TAPE RECORDERS. MISSION LIFE WAS ONE YEAR WITH POSSIBLE EXTENSION.

----- STP P78-2, AGGSON-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- 79-007A-05 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE S1
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - T.L. AGGSON NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC10) MEASURED THE ABSOLUTE POTENTIAL BETWEEN THE SATELLITE AND THE PLASMA USING A 100-M TIP-TO-TIP DIPOLE ANTENNA. THE ANTENNA ELEMENTS WERE COPPER-BERYLLIUM STEM EXTENDABLE ANTENNAS AND WERE 0.64-CM DIAMETER TUBES WHEN EXTENDED. TWO 50-M ELEMENTS PLUS THE 1.7-M SPACECRAFT BODY MADE THE TOTAL LENGTH 101.7 M. THE ANTENNA ELEMENTS WERE INSULATED EXCEPT FOR 20 METERS AT THE ENDS. THUS, FOR AMBIENT PLASMA CONDITIONS, THE CONDUCTING SEGMENTS OF THE ANTENNA WERE POSITIONED OUTSIDE THE SHEATH REGION. DC ELECTRIC FIELDS FROM 0.1 TO 20 MILLIVOLTS/M WERE MEASURED, AND AC FIELDS IN THE FREQUENCY RANGE FROM 3 TO 200 HZ WERE MEASURED FROM 1 TO 100 MICROVOLTS/M.

----- STP P78-2, BLAKE-----

INVESTIGATION NAME- ENERGETIC PROTON DETECTOR

NSSDC ID- 79-007A-14 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.B. BLAKE AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT (PART OF SC2) MEASURED THE PROTON FLUX IN THE ENERGY RANGE FROM 20 TO 1000 KEV IN SIX DIFFERENTIAL CHANNELS PLUS INTEGRAL FLUXES FOR ENERGIES ABOVE 1 AND 3 KEV.

----- STP P78-2, COHEN-----

INVESTIGATION NAME- ELECTRON GUN-ION GUN

NSSDC ID- 79-007A-07 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
TECHNOLOGY
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - H.A. COHEN USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC4) CONSISTED OF AN ELECTRON-BEAM SYSTEM (EBS) AND A POSITIVE-ION-BEAM SYSTEM (PIBS), WHICH WERE FLOWN TO CONTROL THE EJECTION, RESPECTIVELY, OF NEGATIVE CHARGE (ELECTRONS) AND POSITIVE CHARGE (XENON IONS) FROM THE SPACE VEHICLE. THE EBS CONSISTED OF A CONTROL GRID AND AN INDIRECTLY HEATED OXIDE-COVERED CATHODE, WHICH WAS KEPT AT A CONTROLLED NEGATIVE POTENTIAL WITH RESPECT TO THE SPACE VEHICLE. THE CONTROLLED NEGATIVE POTENTIAL DETERMINED THE ENERGY OF EJECTED ELECTRONS AND VARIED IN STEPS AS FOLLOWS (IN VOLTS): 50, 150, 300, 500, 1500, AND 3000. THE CONTROL GRID WAS NORMALLY KEPT NEGATIVE WITH RESPECT TO THE CATHODE AND WAS PULSED POSITIVELY TO ALLOW ELECTRON EJECTION CURRENT. THE DURATION AND ELECTRON-CURRENT LEVEL OF THE PULSE WERE CONTROLLED BY GROUND COMMAND. A FOCUSING ELEMENT BETWEEN THE CONTROL GRID AND THE GROUNDED EXIT ANODE SERVED TO REDUCE THE BEAM DIVERGENCE. THE MAGNITUDE OF THE BEAM CURRENT COULD VARY SIX STEPS (IN MILLIAMPERES) - 0.001, 0.01, 0.10, 1.0, 6.0, AND 13. THE MAXIMUM POWER DRAWN WAS 42 W. MOUNTED IN BONDED ELECTRICAL CONTACT WITH THE SPACECRAFT FRAME GROUND, THE EBS WAS ORIENTED SO THAT THE BEAM AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. A PROTECTIVE APERTURE COVER WAS REMOVED BY GROUND COMMAND WHEN THE SPACECRAFT WAS IN ORBIT. THE PIBS CONSISTED OF A PENNING DISCHARGE-CHAMBER ION SOURCE AND A CONTROL GRID. THE ION SOURCE CONSISTED OF AN IONIZATION CHAMBER AND BEAM FORMATION ELECTRODES. A CYLINDER OF PRESSURED XENON CONSTITUTED THE GAS SOURCE AND WAS CONTROLLED BY A LEAK VALVE WITH THE FLOW RATE COMMANDABLE FROM THE GROUND. THE INTENSITY AND DURATION OF THE ION BEAM WAS ALSO DETERMINED BY GROUND COMMAND. THE TWO BEAM BIAS VOLTAGES WERE 1000 V D.C. AND 2000 V D.C., AND THE FIVE SELECTABLE BEAM INTENSITY LEVELS WERE (IN MILLIAMPERES) - 0.3, 0.5, 1.0, 1.5, AND 2.0. DURING MAXIMUM BEAM EJECTION, THE POWER DRAWN WAS 60 W. THE PIBS NOZZLE WAS THE ELEMENT THAT CONTROLLED THE NATURE OF THE EJECTED BEAM, AND THE THIN WIRES MOUNTED ON TOP OF THE NOZZLE COULD NEUTRALIZE ALL OR A FRACTION (INCLUDING ZERO) OF THE BEAM, DEPENDING ON SATELLITE EXPERIMENT REQUIREMENTS. THE EXPELLANT STORAGE TANK WAS CONNECTED TO THE ION SOURCE THROUGH A PRESSURE REGULATOR, A SOLENOID-OPERATED LATCHING, A POROUS PLUG, AND AN INSULATOR. THE ION SOURCE WAS MAINTAINED UNDER VACUUM AND OPENED TO THE ATMOSPHERE IN ORBIT ON COMMAND.

----- STP P78-2, FENNEL-----

INVESTIGATION NAME- SPACECRAFT SHEATH FIELDS DETECTOR

NSSDC ID- 79-007A-06 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.F. FENNEL AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC2) CONTAINED THREE ELECTROSTATIC ANALYZERS - TWO MOUNTED 180 DEG APART ON BOOMS, AND THE THIRD MOUNTED ON THE SPACECRAFT BODY. THE THREE SENSORS HAD THE SAME LOOK DIRECTION, SO THAT IF THERE WERE NO ELECTRIC FIELDS ABOUT THE SATELLITE, ALL THREE SENSORS WOULD MEASURE THE SAME FLUX, SPECTRUM, AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 1 TO 1000 EV. AN OPTICAL DATA-TRANSMISSION SYSTEM WAS USED TO TELEMETER DIGITAL DATA FROM THE ANALYZERS TO THE SATELLITE DATA-PROCESSING SYSTEM TO MAINTAIN ELECTRICAL ISOLATION AT THE ANALYZERS. THE POTENTIAL OF THE SPHERES RELATIVE TO THE SATELLITE REFERENCE POINT WAS ALSO MEASURED. POTENTIAL MEASUREMENTS AT THREE POSITIONS IN THE PLASMA SHEATH WERE OBTAINED. THE EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, HALL-----

INVESTIGATION NAME- QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS

NSSDC ID- 79-007A-03 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.F. HALL AEROSPACE CORP

BRIEF DESCRIPTION

IN THIS EXPERIMENT (PART OF ML12), TWO QUARTZ-CRYSTAL MICROBALANCES WERE PLACED IN RETARDING POTENTIAL ANALYZERS, WITH ONE MICROBALANCE-ANALYZER SET MOUNTED ON THE SPACECRAFT SIDE, AND THE OTHER SET PLACED ON A SPACECRAFT END MAINTAINED IN CONTINUOUS SHADOW. THE RETARDING POTENTIAL ANALYZER WAS USED TO EXCLUDE IONS FROM THE MICROBALANCE AND TO MAINTAIN A ZERO-ELECTRIC-FIELD CONDITION AT THE SENSOR. TO DETERMINE THE DEPENDENCE OF CONTAMINATION RATE UPON SURFACE CHARGE, MEASUREMENTS WERE MADE WITH AND WITHOUT THE RETARDING-POTENTIAL BIAS. THE QUARTZ SENSORS HAD AN ACTIVE TEMPERATURE CONTROL AND COULD BE OPERATED OVER A RANGE OF TEMPERATURES FROM -60 TO +60 DEG C.

----- STP P78-2, HALL-----

INVESTIGATION NAME- THERMAL CONTROL SAMPLE MONITOR

NSSDC ID- 79-007A-04

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.F. HALL

AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT (PART OF ML12) EVALUATED THE PERFORMANCE OF THERMAL-CONTROL MATERIALS AS A FUNCTION OF ORBIT CONTAMINATION CONDITIONS. THE SENSOR MEASURED THE BACKFACE TEMPERATURE OF EIGHT THERMAL-CONTROL-MATERIAL SAMPLES. THE INSTRUMENTS WERE POSITIONED CONTIGUOUSLY WITH THE QUARTZ CRYSTAL MONITORS. IT WAS POSSIBLE TO HEAT THE SAMPLES AND TO PURGE CONTAMINANTS WHICH FROZE OUT ON THE TEST SURFACE.

----- STP P78-2, HARDY-----

INVESTIGATION NAME- RAPID SCAN PARTICLE DETECTOR

NSSDC ID- 79-007A-12

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.A. HARDY

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC5) EMPLOYED CURVED-PLATE ELECTROSTATIC ANALYZERS AND SOLID-STATE SPECTROMETERS TO MEASURE THE FLUX OF ELECTRONS AND IONS. THE EXPERIMENT RECORDED A SPECTRUM FOR BOTH ELECTRONS AND IONS ONCE PER SECOND IN TWO ORTHOGONAL DIRECTIONS. THE ELECTRON FLUX WAS MEASURED IN 16 ENERGY RANGES SPANNING 50 EV TO 1.1 MEV. THE ION FLUX WAS MEASURED IN 16 ENERGY RANGES SPANNING 50 EV TO 35 MEV. ANY GIVEN ENERGY CHANNEL COULD BE READ OUT WITH A TIME RESOLUTION OF 240 MICROSECONDS.

----- STP P78-2, JOHNSON-----

INVESTIGATION NAME- ENERGETIC ION SPECTROMETER

NSSDC ID- 79-007A-13

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.G. JOHNSON

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SCB) MEASURED THE FLUX OF IONS, WITH MASS RANGE 1 TO 150 U, IN THE ENERGY RANGE FROM 100 TO 20,000 EV. THE SENSOR WAS AN ENERGETIC ION MASS SPECTROMETER.

----- STP P78-2, KOONS-----

INVESTIGATION NAME- CHARGING ELECTRICAL EFFECTS ANALYZER

NSSDC ID- 79-007A-02

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
TECHNOLOGY
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M.C. KOONS

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURED ELECTROMAGNETIC INTERFERENCE IN THE RANGE 100 TO 1.67 HZ. THREE SEPARATE INSTRUMENTS WERE USED. THE FREQUENCY RANGE FROM 2 TO 30 MHZ WAS MEASURED WITH A SWEEP-FREQUENCY ANALYZER. THE FREQUENCY BAND 1.3 TO 300 KHZ WAS MONITORED BY FIXED-FREQUENCY ANALYZERS. THE CAPABILITY ALSO EXISTED TO TELEMETER BROADBAND SIGNALS FROM SENSORS IN THE FREQUENCY BAND 100 TO 5000 HZ. THE ANALYZER SAMPLED SIGNALS FROM A VARIETY OF SENSORS, INCLUDING SOLAR ARRAY BUS, POWER LINE BUS, TYPICAL COMMAND LINE, EXTERNAL SHORT DIPOLE, AND ELECTRIC-FIELD DETECTOR BOOM. THIS EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, LEDLEY-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 79-007A-08

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.G. LEDLEY

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC11) OBTAINED TRIAXIAL MEASUREMENTS OF THE GEOMAGNETIC FIELD. A BOOM-MOUNTED (A 7-M BOOM) FLUXGATE MAGNETOMETER WAS USED. TIME RESOLUTION WAS FOUR VECTORS PER S. FIELD RESOLUTION WAS APPROXIMATELY 0.3 NT WITH A DYNAMIC RANGE OF PLUS AND MINUS APPROXIMATELY 450 NT PER AXIS. SENSOR RESPONSE WAS FROM DC TO 70 HZ.

----- STP P78-2, NIZERA-----

INVESTIGATION NAME- SPACECRAFT SURFACE POTENTIAL MONITOR

NSSDC ID- 79-007A-01

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
TECHNOLOGY
SPACE PLASMAS

PERSONNEL

PI - P.F. NIZERA

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURED THE SURFACE POTENTIAL OF SEVEN DIFFERENT TYPES OF MATERIALS RELATIVE TO A GOLD CYLINDRICAL COMMON REFERENCE POINT ON THE SATELLITE. THE SAMPLE WAS POINTED ON ONE SURFACE OF A DIELECTRIC SLAB, AND A CONDUCTING PLATE WAS MOUNTED ON THE OTHER SURFACE. THE SURFACE POTENTIAL WAS MEASURED FROM LEAKAGE CURRENTS AND BY A CHOPPED ELECTROMETER (MONROE DETECTORS). SOME OF THE MATERIALS USED WERE: SILICON, CLOTH FABRIC, SOLAR CELL COVER GLASSES, GOLD (REFERENCE), SILVER-TEFLON, AND KAPTON MULTILAYER INSULATION. FIVE OF THE SAMPLES WERE PLACED ON THE SIDES OF THE SATELLITE AND ROTATED IN AND OUT OF SUNLIGHT. FOUR SAMPLES WERE LOCATED AT THE END OF THE SPACECRAFT IN SHADOW. THIS EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, NANEVICZ-----

INVESTIGATION NAME- TRANSIENT PULSE MONITOR

NSSDC ID- 79-007A-16

INVESTIGATIVE PROGRAM

INVESTIGATION DISCIPLINE(S)

PERSONNEL

PI - J.E. NANEVICZ

STANFORD RES INST

BRIEF DESCRIPTION

----- STP P78-2, REAGAN-----

INVESTIGATION NAME- HIGH-ENERGY PARTICLE DETECTOR

NSSDC ID- 79-007A-15

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.B. REAGAN

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC3) MEASURED THE ELECTRON FLUX IN THE 0.3 TO 2.1 MEV RANGE, THE PROTON FLUX IN THE 1 TO 100 MEV RANGE, AND ALPHA PARTICLES FROM 6 TO 60 MEV. A HIGH-ENERGY PARTICLE SPECTROMETER WAS USED TO DETERMINE FLUX AND PITCH-ANGLE DISTRIBUTIONS.

----- STP P78-2, WHIPPLE-----

INVESTIGATION NAME- UCSD CHARGED PARTICLE DETECTOR

NSSDC ID- 79-007A-11

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL

PI - E. WHIPPLE

U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC9) MEASURED THE ELECTRON AND ION DIFFERENTIAL FLUX, ENERGY, AND PITCH-ANGLE DISTRIBUTION. THIS PARTICLE DETECTOR MEASURED ENERGY SPECTRA IN 64 STEPS BETWEEN 1 AND 70,000 EV. THE ACCEPTANCE ANGLE OF THE TELESCOPE WAS 5 DEG HALF-ANGLE. THIS SAME TYPE INSTRUMENT FLEW ON THE ATS 5 AND ATS 6 SPACECRAFT.

***** TIP 1*****

SPACECRAFT COMMON NAME- TIP 1
ALTERNATE NAMES- TRIAD 1, TRIAD 01 1X
TRIAD A, 06173
TRIAD

NSSDC ID- 72-069A

LAUNCH DATE- 09/02/72 WEIGHT- 94. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-NAVY

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/04/72
ORBIT PERIOD- 100.7 MIN INCLINATION- 90.1 DEG
PERIAPSIS- 716.0 KM ALT APOAPSIS- 863.0 KM ALT

PERSONNEL
PM - J. DASSOULAS APPLIED PHYSICS LAB
PS - R.L. FISCHELL APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS THREE-BODY SPACECRAFT WAS CONNECTED BY BOOMS WHICH SERVED AS GRAVITY GRADIENT STABILIZERS IN THE RADIAL DIRECTION. A MOMENTUM WHEEL WAS USED FOR STABILIZATION IN ROLL AND YAW. THE PRIMARY FUNCTION OF THE SPACECRAFT WAS TO TEST VARIOUS CONCEPTS FOR IMPROVING THE USN TRANSIT NAVIGATION SYSTEM. THE POWER WAS SUPPLIED BY A RADIOISOTOPE THERMAL ELECTRIC GENERATOR (RTG).

***** TIP 1, POTEMRA*****

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 72-069A-01 INVESTIGATIVE PROGRAM
NAVIGATION TECHNOLOGY

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - T.A. POTEMRA APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO MEASURE VECTOR FIELDS WITH MAGNITUDES UP TO 50,000 NT. MEASUREMENTS WERE MADE BY SAMPLING EACH AXIS SEQUENTIALLY AT A RATE OF 2.25 SAMPLES/S. DIGITIZATION RESOLUTION WAS ABOUT 10 NT AS GIVEN BY A 13-BIT ANALOG-TO-DIGITAL CONVERTER, BUT ZERO-LEVEL DRIFTS WERE NOT READILY CHECKED. AS SUCH, THE EXPERIMENT WAS MOST USEFUL IN STUDIES OF MAGNETIC FLUCTUATIONS. DUE TO THE REAL-TIME DATA TRANSMISSION AND THE LOCATIONS OF THE TRACKING STATIONS, MOST OF THE DATA OBTAINED RELATED TO NORTHERN AND SOUTHERN HEMISPHERE HIGH LATITUDES.

***** TIROS-N*****

SPACECRAFT COMMON NAME- TIROS-N
ALTERNATE NAMES- 11060

NSSDC ID- 78-096A

LAUNCH DATE- 10/14/78 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/14/78
ORBIT PERIOD- 102. MIN INCLINATION- 96.9 DEG
PERIAPSIS- 846. KM ALT APOAPSIS- 862. KM ALT

PERSONNEL
ML - R. ARNOLD NASA HEADQUARTERS
PM - G.W. LONGMECKER NASA-GSFC

BRIEF DESCRIPTION

TIROS-N WAS AN OPERATIONAL METEOROLOGICAL SATELLITE FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS), AND SUPPORTED THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER, AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER-VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURED THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSED AND RELAYED TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

***** TIROS-N, NESS STAFF*****

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- 78-096A-01 INVESTIGATIVE PROGRAM
CODE 28/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE TIROS-N ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA-SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURED EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER; CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS; CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS; AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.95 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR-WINDOW CHANNELS HAD A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4-KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1-KM) RESOLUTION VIA HIGH-RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA, WITH A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC), THAT CONTAINED DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1-KM RESOLUTION. IDENTICAL EXPERIMENTS WERE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

***** TIROS-N, NESS STAFF*****

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- 78-096A-02 INVESTIGATIVE PROGRAM
CODE 14/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE TIROS-N OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE HIGH-RESOLUTION INFRARED SPECTROMETER (HIRS/2), HAD 20 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.0-MICROMETER WINDOW REGION, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5, 6 - 13.3, 13.6-MICROMETER CO2/H2O BAND, CHANNELS 7 THROUGH 11 - THE 15-MICROMETER CO2 BAND (14.0, 14.2, 14.5, 14.7, AND 15.0), CHANNELS 12 THROUGH 14 - THE 6-MICROMETER WATER VAPOR BANDS (6.7, 7.3, AND 8.3), CHANNELS 15, 16 - 4.52, 4.57-MICROMETER H2O BAND, CHANNELS 17, 18 - 4.46, 4.40-MICROMETER CO2/H2O BAND, CHANNEL 19 - 4.26-MICROMETER CO2 BAND, AND CHANNEL 20 - .70-MICROMETER WINDOW. THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 15.0 MICROMETERS USING SELECTIVE ABSORPTION, PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.31, 53.73, 54.96, AND 57.95) TO OBTAIN TEMPERATURE PROFILES WHICH WERE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN, WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDED SCANNING IN THE

ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-096A-03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON TIROS-N WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT CAME IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS WAS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS N/NOAA SERIES.

----- TIROS-N, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- 78-096A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R. SEALE NOAA-ERL
OI - R.N. GRUBB NOAA-ERL
OI - D.S. EVANS NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED, IN FIVE ENERGY RANGES, PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE WERE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 30-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURED PROTONS ABOVE 10, 30, AND 60 MEV; ELECTRONS ABOVE 140 KEV; AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEWED IN THE ANTI-EARTH DIRECTION, AND MEASURED PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** UK 6 *****

SPACECRAFT COMMON NAME- UK 6
ALTERNATE NAMES- UNITED KINGDOM-6, ARIEL 6
11382

NSSDC ID- 79-047A

LAUNCH DATE- 06/02/79 WEIGHT- 152. KG
LAUNCH SITE- Wallops Flight Center, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED KINGDOM SRC
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/02/79
ORBIT PERIOD- 97.3 MIN INCLINATION- 55. DEG
PERIAPSIS- 605. KM ALT APOAPSIS- 651. KM ALT

PERSONNEL
PM - J.E. FOSTER RUTHERFORD/APPLTON LAB
PS - J.L. CULHANE U COLLEGE LONDON

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS MISSION WAS TO UNDERTAKE STUDIES IN HIGH-ENERGY ASTROPHYSICS. TWO X-RAY EXPERIMENTS, ONE COSMIC-RAY EXPERIMENT, AND THREE TECHNOLOGY EXPERIMENTS WERE CARRIED. THE SPACECRAFT WAS SPIN STABILIZED, WITH THE SPIN AXIS COMMANDED INTO A SEQUENCE OF ORIENTATIONS TO ACCOMMODATE THE X-RAY EXPERIMENT REQUIREMENTS.

----- UK 6, BOYD-----

INVESTIGATION NAME- X-RAY GRAZING INCIDENCE SYSTEM

NSSDC ID- 79-047A-03 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.L.F. BOYD U COLLEGE LONDON
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - A.M. CRUISE U COLLEGE LONDON
OI - C.V. GOODALL U OF BIRMINGHAM

BRIEF DESCRIPTION

THIS SYSTEM CONSISTED OF FOUR GRAZING-INCIDENCE HYPERBOLOID MIRRORS THAT REFLECTED X RAYS THROUGH AN APERTURE/FILTER TO FOUR CONTINUOUS-FLOW PROPANE GAS DETECTORS COVERED WITH A ONE-MICROMETER POLYPROPYLENE WINDOW. THE INSTRUMENT WAS SENSITIVE TO X RAYS FROM 0.1 TO 2 KEV AND HAD SEVEN SELECTABLE FIELDS OF VIEW FROM 0.2 TO 3.6 DEG. THE SYSTEM COULD BE OPERATED IN FOUR DIFFERENT MODES: SPECTRAL (32 CHANNELS OF PULSE HEIGHT), TIME (0.5 MS TO 16 S), PULSAR (PERIODS FROM 1 MS TO 4 H), AND AUTOCORRELATOR (PERIODIC VARIATIONS FROM 1.8 MS TO 2 S). THE DETECTORS POINTED ALONG THE SPACECRAFT SPIN AXIS.

----- UK 6, FOWLER-----

INVESTIGATION NAME- COSMIC RAY

NSSDC ID- 79-047A-01 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL
PI - P.H. FOWLER U OF BRISTOL

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF FOUR PI CERENKOV AND GAS SCINTILLATION COUNTERS WITH A GEOMETRIC FACTOR OF TWO SQ M-SR THAT WERE USED TO MEASURE THE CHARGE AND ENERGY SPECTRA OF THE ULTRAHEAVY COMPONENT OF COSMIC RADIATION WITH PARTICULAR EMPHASIS ON THE CHARGE REGION 2 GREATER THAN OR EQUAL TO 30.

----- UK 6, POUNDS-----

INVESTIGATION NAME- X-RAY PROPORTIONAL COUNTERS

NSSDC ID- 79-047A-02 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - K.A. POUNDS U OF LEICESTER

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF AN ARRAY OF PROPORTIONAL COUNTERS THAT OPERATED OVER THE ENERGY RANGE 1.3 TO 30 KEV. BRIGHT X-RAY SOURCES COULD BE MEASURED TO SEVERAL MICROSECONDS TIME RESOLUTION, AND SPECTRAL DATA WERE OBTAINED IN 32 CHANNELS.

***** VENERA 11 *****

SPACECRAFT COMMON NAME- VENERA 11
ALTERNATE NAMES- 11020

NSSDC ID- 78-084A

LAUNCH DATE- 09/09/78 WEIGHT- KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
U.S.S.R. SAS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE-
ORBIT PERIOD- DAYS INCLINATION-
PERIAPSIS- AU RAD APOAPSIS- AU RAD

PERSONNEL
PM - UNKNOWN IKI
PS - V.G. KURT IKI

BRIEF DESCRIPTION

VENERA 11 WAS PART OF A TWO-SPACECRAFT MISSION TO STUDY VENUS AND THE INTERSOLAR MEDIUM. EACH OF THE TWO SPACECRAFT, VENERA 11 AND VENERA 12, CONSISTED OF A FLIGHT PLATFORM AND A LANDER PROBE. IDENTICAL INSTRUMENTS WERE CARRIED ON THE SPACECRAFT. THE FLIGHT PLATFORM HAD INSTRUMENTS TO STUDY SOLAR-WIND COMPOSITION, GAMMA-RAY BURSTS, ULTRAVIOLET RADIATION, AND THE ELECTRON COMPOSITION OF THE IONOSPHERE OF VENUS. THE LANDER PROBE CARRIED INSTRUMENTS TO STUDY THE CHARACTERISTICS AND COMPOSITION OF THE ATMOSPHERE OF VENUS. AFTER EJECTION OF THE LANDER PROBE, THE FLIGHT PLATFORM

CONTINUED IN A HELIOCENTRIC ORBIT. NEAR ENCOUNTER WITH VENUS OCCURRED ON DECEMBER 25, 1978, AT APPROXIMATELY 34,000 KM ALTITUDE.

----- VENERA 11, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 78-084A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - I.V. ESTULIN IKI
PI - G. VEDRENNE CESR

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SOLAR AND COSMIC GAMMA-RAY BURSTS, TO ACCURATELY MEASURE THEIR POSITION IN CONJUNCTION WITH MEASUREMENTS FROM OTHER SPACECRAFT, AND TO DETERMINE THE ENERGY SPECTRA AND TEMPORAL CHARACTERISTICS OF THE BURSTS. THE INSTRUMENTATION CONSISTED OF TWO SCINTILLATION DETECTORS. ONE WAS POINTED TOWARDS THE SUN; THE OTHER WAS AT 180 DEG FROM THE FIRST. THE DETECTORS MEASURED 0.08 TO 2.5 MEV IN 7 CHANNELS. THE DETECTORS HAD A SENSITIVITY OF $5.0E-6$ ERGS/SQ CM FOR EACH GAMMA-RAY BURST DETECTED.

----- VENERA 11, GRINGAUZ-----

INVESTIGATION NAME- RETARDING POTENTIAL TRAPS

NSSDC ID- 78-084A-02 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - K.I. GRINGAUZ IKI

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO STUDY THE ENERGY SPECTRA OF THE ION AND ELECTRON COMPONENTS OF THE SOLAR WIND AT VARYING DISTANCES FROM THE SUN. THE INSTRUMENT WAS A RETARDING POTENTIAL ANALYZER WHICH MEASURED IONS FROM 0 TO 4.5 KEV AND ELECTRONS FROM 0 TO 300 EV. THE DETECTOR HAD A SENSITIVITY OF $3.0E+5$ TO $3.0E+9$ /SQ CM/S. IT WAS OPERATED AT INTERVALS DURING THE MISSION.

----- VENERA 11, KURT-----

INVESTIGATION NAME- LV GRATING MONOCHROMATOR

NSSDC ID- 78-084A-03 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - V.G. KURT IKI
PI - J.L. BERTAUX CNRS-SA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SCATTERED UV RADIATION FROM INTERPLANETARY SPACE AND VENUS BY ANALYZING SPECTRA LINES AT 304, 584, 736, 849, 1048, 1216, 1300, 1356, AND 1500 A. DETERMINATIONS OF LINE SPECTRA FOR H, HE I, HE II, O I, NE I, AR I, AND CO WERE MADE WHEN THE SPACECRAFT WAS CLOSE TO VENUS. LINE INTENSITIES FOR H, HE I, AND HE II WERE DETERMINED WHILE THE SPACECRAFT WAS IN INTERPLANETARY SPACE. THE DETECTOR CONSISTED OF A MULTICHANNEL GRATING MONOCHROMATOR WITH THE OPTICAL AXIS ORIENTED IN THE ANTI-SOLAR DIRECTION. THIS INVESTIGATION WAS OPERATED AT SELECTED INTERVALS DURING THE MISSION INCLUDING A SCAN OF THE SOLAR-ILLUMINATED DISK OF VENUS.

----- VENERA 11, LOGACHEV-----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 78-084A-04 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - YU.I. LOGACHEV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE THE SPECTRA AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE SOLAR WIND. IT USED PROPORTIONAL COUNTERS, GEIGER COUNTERS, AND SEMICONDUCTOR AND SCINTILLATION DETECTORS. ELECTRONS FROM 5 TO 500 KEV AND PROTONS IN TWO RANGES: 0.05 TO 1 MEV AND 30 TO 200 MEV WERE MEASURED. THE INSTRUMENTATION HAD A SENSITIVITY UP TO $5.0E+5$ /SQ CM/S/SR.

----- VENERA 11, MAZETS-----

INVESTIGATION NAME- GAMMA-RAY BURST DETECTORS

NSSDC ID- 78-084A-05 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - E.P. MAZETS LENGRAU INST PHYS TECH

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE COORDINATES OF GAMMA-RAY BURSTS TO WITHIN 2-3 DEG. THE INSTRUMENTATION CONSISTED OF SIX IDENTICAL SCINTILLATION DETECTORS WITH THEIR ORIENTATION ALONG THE GEOMETRIC AXIS OF THE SPACECRAFT. THEY HAD A MEASUREMENT RANGE OF 20 TO 300 KEV WITH A SENSITIVITY OF $1.0E-6$ ERGS/SQ CM.

----- VENERA 11, PISARENKO-----

INVESTIGATION NAME- PROTON SPECTROMETER

NSSDC ID- 78-084A-06 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - N.F. PISARENKO IKI

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY PROTON ACCELERATION IN THE INTERPLANETARY MEDIUM AND THE SOLAR-ACTIVITY PROCESSES INVOLVED IN THE ORIGIN OF CHARGED PARTICLES. THE INSTRUMENTATION CONSISTED OF A SEMICONDUCTOR SPECTROMETER WITH AN SI N-P DETECTOR. IT HAD 10 CHANNELS COVERING FROM 0.1 TO 100 MEV, AND WAS SENSITIVE TO A FLUX OF $1.0E+4$ PROTONS/SQ CM/S AT 10 MEV.

----- VENERA 11, SAVICH-----

INVESTIGATION NAME- TWO-FREQUENCY TRANSMITTERS

NSSDC ID- 78-084A-07 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - N.A. SAVICH IRE

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY THE ELECTRON CONCENTRATION DISTRIBUTION IN THE IONOSPHERE OF VENUS AND TO STUDY FLUCTUATION OF ELECTRON CONCENTRATION IN INTERPLANETARY AND NEAR-SUN PLASMAS. THIS INVESTIGATION USED RADIO TRANSMISSIONS IN THE CENTIMETER AND DECIMETER RANGE.

----- VENERA 11, VAISBERG-----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTORS

NSSDC ID- 78-084A-08 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - O.L. VAISBERG IKI

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO MEASURE THE ENERGY SPECTRA OF THE SOLAR WIND ION AND ELECTRON COMPONENTS. IT ALSO MEASURED SEPARATELY PROTONS AND ALPHA PARTICLES AT VARYING DISTANCES FROM THE SUN. THE INVESTIGATION USED ELECTROSTATIC ANALYZERS AND A PARADAY CYLINDER. ELECTRONS WERE MEASURED FROM 10 TO 200 EV IN 24 STEPS, TOTAL ION CONCENTRATIONS FROM 0.25 TO 5 KEV IN 24 STEPS, PROTONS FROM 0.25 TO 5 KEV IN 24 STEPS, AND ALPHA PARTICLES FROM 0.5 TO 10 KEV IN 24 STEPS. SPECTRAL MEASUREMENTS TOOK 192 S. THE FLUX SENSITIVITY WAS $5.0E+7$ TO $1.0E+10$ /SQ CM/S. THE INSTRUMENT WAS OPERATED AT INTERVALS DURING THE FLIGHT PATH.

***** VENERA 12*****

SPACECRAFT COMMON NAME- VENERA 12
ALTERNATE NAMES- 11025

NSSDC ID- 78-086A

LAUNCH DATE- 09/14/78 WEIGHT- KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
U.S.S.R. SAS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE-
ORBIT PERIOD- DAYS INCLINATION- DEG
PERIAPSIS- AU RAD APOAPSIS- AU RAD

PERSONNEL
PM - UNKNOWN IKI
PS - V.G. KURT IKI

BRIEF DESCRIPTION
VENERA 12 WAS PART OF A TWO-SPACECRAFT MISSION TO STUDY VENUS AND THE INTERSOLAR MEDIUM. EACH OF THE TWO SPACECRAFT, VENERA 11 AND VENERA 12, CONSISTED OF A FLIGHT PLATFORM AND A LANDER PROBE. IDENTICAL INSTRUMENTS WERE CARRIED ON THE SPACECRAFT. THE FLIGHT PLATFORM HAD INSTRUMENTS TO STUDY SOLAR WIND COMPOSITION, GAMMA-RAY BURSTS, ULTRAVIOLET RADIATION, AND THE ELECTRON COMPOSITION OF THE IONOSPHERE OF VENUS. THE LANDER PROBE CARRIED INSTRUMENTS TO STUDY THE CHARACTERISTICS AND COMPOSITION OF THE ATMOSPHERE OF VENUS. AFTER EJECTION OF THE LANDER PROBE, THE FLIGHT PLATFORM CONTINUED IN A HELIOCENTRIC ORBIT. NEAR ENCOUNTER WITH VENUS OCCURRED ON DECEMBER 21, 1978, AT APPROXIMATELY 34,000 KM ALTITUDE.

----- VENERA 12, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 78-086A-01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - I.V. ESTULIN IKI
PI - G. VEDRENNE CESR

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SOLAR AND COSMIC GAMMA-RAY BURSTS, TO ACCURATELY MEASURE THEIR POSITION IN CONJUNCTION WITH MEASUREMENTS FROM OTHER SPACECRAFT, AND TO DETERMINE THE ENERGY SPECTRA AND TEMPORAL CHARACTERISTICS OF THE BURSTS. THE INSTRUMENTATION CONSISTED OF TWO SCINTILLATION DETECTORS. ONE WAS POINTED TOWARD THE SUN, AND THE OTHER WAS AT 180 DEG FROM THE FIRST. THE DETECTORS MEASURED 0.08 TO 2.5 MEV IN 7 CHANNELS. THE DETECTORS HAD A SENSITIVITY OF $5.0E-6$ ERGS/SQ CM FOR EACH GAMMA-RAY BURST DETECTED.

----- VENERA 12, GRINGAUZ-----

INVESTIGATION NAME- RETARDING POTENTIAL TRAPS

NSSDC ID- 78-086A-02 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - K.I. GRINGAUZ IKI

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION WAS TO STUDY THE ENERGY SPECTRA OF THE ION AND ELECTRON COMPONENTS OF THE SOLAR WIND AT VARYING DISTANCES FROM THE SUN. THE INSTRUMENT WAS A RETARDING POTENTIAL ANALYZER WHICH MEASURED IONS FROM 0 TO 4.5 KEV AND ELECTRONS FROM 0 TO 300 EV. THE DETECTOR HAD A SENSITIVITY OF $3.0E-5$ TO $3.0E-9$ /SQ CM/S. IT WAS OPERATED AT INTERVALS DURING THE MISSION.

----- VENERA 12, KURT-----

INVESTIGATION NAME- UV GRATING MONOCHROMATOR

NSSDC ID- 78-086A-03 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
ASTROPHYS

PERSONNEL
PI - V.G. KURT IKI
PI - J.L. BERTAUX CNRS-SA

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SCATTERED UV RADIATION FROM INTERPLANETARY SPACE AND VENUS BY ANALYZING SPECTRAL LINES AT 304, 584, 736, 869, 1048, 1216, 1300, 1356, AND 1500 A. DETERMINATIONS OF LINE SPECTRA FOR H, HE I, HE II, O I, NE I, AR I, AND CO WERE MADE WHEN THE SPACECRAFT WAS CLOSE TO VENUS. LINE INTENSITIES FOR H, HE I, AND HE II WERE DETERMINED WHILE THE SPACECRAFT WAS IN INTERPLANETARY SPACE. THE DETECTOR CONSISTED OF A MULTICHANNEL

GRATING MONOCHROMATOR WITH THE OPTICAL AXIS ORIENTED IN THE ANTI-SOLAR DIRECTION. THIS INVESTIGATION WAS OPERATED AT SELECTED INTERVALS DURING THE MISSION INCLUDING A SCAN OF THE SOLAR ILLUMINATED VENUS' DISK.

----- VENERA 12, LOGACHEV-----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 78-086A-04 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - VU.I. LOGACHEV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE THE SPECTRA AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE SOLAR WIND. IT USED PROPORTIONAL COUNTERS, GEIGER COUNTERS, AND SEMICONDUCTOR AND SCINTILLATION DETECTORS. ELECTRONS FROM 5 TO 500 KEV AND PROTONS IN TWO RANGES: 0.05 TO 1 MEV AND 30 TO 200 MEV, WERE MEASURED. THE INSTRUMENTATION HAD A SENSITIVITY UP TO $5.0E-5$ /SQ CM/S/SR.

----- VENERA 12, MAZETS-----

INVESTIGATION NAME- GAMMA-RAY BURST DETECTORS

NSSDC ID- 78-086A-05 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - E.P. MAZETS LENGRAU INST PHYS TECH

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE COORDINATES OF GAMMA-RAY BURSTS TO WITHIN 2-3 DEG. THE INSTRUMENTATION CONSISTED OF SIX IDENTICAL SCINTILLATION DETECTORS WITH THEIR ORIENTATION ALONG THE GEOMETRIC AXIS OF THE SPACECRAFT. THEY HAD A MEASUREMENT RANGE OF 20 TO 300 KEV WITH A SENSITIVITY OF $1.0E-6$ ERGS/SQ CM.

----- VENERA 12, PISARENKO-----

INVESTIGATION NAME- PROTON SPECTROMETER

NSSDC ID- 78-086A-06 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - N.F. PISARENKO IKI

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY PROTON ACCELERATION IN THE INTERPLANETARY MEDIUM, AND THE SOLAR ACTIVITY PROCESSES INVOLVED IN THE ORIGIN OF CHARGED PARTICLES. THE INSTRUMENTATION CONSISTED OF A SEMICONDUCTOR SPECTROMETER WITH AN SI N-P DETECTOR. IT HAD 10 CHANNELS COVERING FROM 0.1 TO 100 MEV AND WAS SENSITIVE TO A FLUX OF $1.0E+4$ PROTONS/SQ CM/S AT 10 MEV.

----- VENERA 12, SAVICH-----

INVESTIGATION NAME- PROTON SPECTROMETER

NSSDC ID- 78-086A-07 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - N.A. SAVICH IRE

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY THE ELECTRON CONCENTRATION DISTRIBUTION IN THE IONOSPHERE OF VENUS AND TO STUDY FLUCTUATION OF ELECTRON CONCENTRATION IN INTERPLANETARY AND NEAR-SUN PLASMAS. THIS INVESTIGATION USED RADIO TRANSMISSIONS IN THE CENTIMETER AND DECIMETER RANGE.

----- VENERA 12, VAISBERG-----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTORS

NSSDC ID- 78-086A-08 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - O.L. VAISBERG

IKI

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO MEASURE THE ENERGY SPECTRA OF THE SOLAR WIND ION AND ELECTRON COMPONENTS. IT ALSO MEASURED SEPARATELY PROTONS AND ALPHA PARTICLES AT VARYING DISTANCES FROM THE SUN. THE INVESTIGATION USED ELECTROSTATIC ANALYZERS AND A PARADAY CYLINDER. ELECTRONS WERE MEASURED FROM 10 TO 200 EV IN 24 STEPS. TOTAL ION CONCENTRATIONS FROM 0.25 TO 5 KEV IN 24 STEPS, PROTONS FROM 0.25 TO 5 KEV IN 24 STEPS, AND ALPHA PARTICLES FROM 0.5 TO 10 KEV IN 24 STEPS. SPECTRAL MEASUREMENTS TOOK 192 S. THE FLUX SENSITIVITY WAS $5.0E+7$ TO $1.0E+10/SQ CM/S$. THE INSTRUMENT WAS OPERATED AT INTERVALS DURING THE FLIGHT PATH.

***** VIKING 1 LANDER*****

SPACECRAFT COMMON NAME- VIKING 1 LANDER
ALTERNATE NAMES- VIKING-B LANDER

NSSDC ID- 75-075C

LAUNCH DATE- 08/20/75 WEIGHT- 605. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL

MG - G.K. STROBEL	NASA HEADQUARTERS
SC - J.M. BOYCE	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	NASA-JPL

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED ON JULY 20, 1976, IN THE CHRYSE REGION OF MARS AT 22.27 DEG N LATITUDE AND 47.94 DEG W LONGITUDE. THE LANDER CARRIED INSTRUMENTS TO STUDY THE BIOLOGY, CHEMICAL COMPOSITION (ORGANIC AND INORGANIC), METEOROLOGY, SEISMOLOGY, MAGNETIC PROPERTIES, SURFACE APPEARANCE, AND PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ATMOSPHERE. THE LANDER HAD A 70-W POWER CAPACITY AND A SCIENTIFIC PAYLOAD OF APPROXIMATELY 91 KG (200 LB). SOME OF THE DATA COLLECTED WERE RETURNED BY DIRECT RADIO LINK TO EARTH, BUT MOST OF THE DATA WERE RETURNED BY RELAY THROUGH ONE OF THE ORBITERS. THE LANDER WAS APPROXIMATELY 3M ACROSS AND ABOUT 2M HIGH.

***** VIKING 1 LANDER, NESS*****

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-075C-07 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - S.L. NESS	FLORIDA STATE U
TM - C.B. LEOVY	U OF WASHINGTON
TM - R.M. HENRY	U OF WASHINGTON
TM - J.A. RYAN	CALIF ST U, FULLERTON
TM - J.E. TYLLMAN	U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT ANALYZED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ATMOSPHERIC PARAMETERS DETERMINED WERE PRESSURE, TEMPERATURE, WIND SPEED, AND WIND DIRECTION. DIURNAL AND SEASONAL VARIATIONS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY (SOL) WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTED BOOM. THREE HOT-FILM ANEMOMETERS, THROUGH WHICH AN ELECTRIC CURRENT WAS PASSED TO HEAT TWO GLASS NEEDLES COATED WITH PLATINUM AND OVERCOATED WITH ALUMINUM OXIDE, WERE USED TO MEASURE WIND SPEED. THE ELECTRIC POWER NEEDED TO MAINTAIN THESE SENSORS AT A FIXED TEMPERATURE ABOVE THE SURROUNDING AIR WAS THE MEASURE OF WIND SPEED. ATMOSPHERIC TEMPERATURE WAS MEASURED BY THREE FINE-WIRE THERMOCOUPLES IN PARALLEL. A THIN METAL DIAPHRAGM, MOUNTED IN A VACUUM-SEALED CASE, WAS USED TO MEASURE ATMOSPHERIC PRESSURE.

***** VIKING 1 LANDER, MICHAEL, JR.*****

INVESTIGATION NAME- LANDER RADIO SCIENCE

NSSDC ID- 75-075C-11 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES
PLANETARY ATMOSPHERES
PLANETOCLOGY

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G.F. LINDBAL	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U
TM - J.P. BRENKLE	NASA-JPL
TM - R.M. TOLSON	NASA-LARC
TM - C.T. STELZRIED	NASA-JPL
TM - G. BORN	NASA-JPL
TM - R. REASENBERG	MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE LANDER S-BAND RADIO TRANSMITTER TO ACQUIRE DOPPLER AND RANGE FOR THE LANDER, UTILIZING THE SAME DEEP-SPACE-NETWORK FACILITIES THAT WERE USED BY THE ORBITERS. THE RESULTING DATA WERE USED TO DETERMINE THE LOCATION OF THE LANDER ON THE PLANET'S SURFACE. THEY ALSO PROVIDED MORE PRECISE INFORMATION ABOUT THE ORBITAL, ROTATIONAL, AND PRECESSIONAL MOTION OF MARS THAN HAD PREVIOUSLY BEEN AVAILABLE. THE TWO PRINCIPAL DIFFERENCES BETWEEN ORBITER AND LANDER TRACKING DATA ARE (1) LANDER TRACKING PERIODS WERE NEVER LONGER THAN 2 M AND WERE SOMETIMES MUCH SHORTER BECAUSE OF THERMAL CONSTRAINTS ON THE DURATION OF LANDER TRANSMITTER OPERATION, AND (2) LANDERS HAD NO X-BAND SIGNALS TO PROVIDE THE CORRECTIONS TO RANGE DATA FOR THE INTERPLANETARY PLASMA EFFECTS. CONSEQUENTLY, LANDER RANGING SESSIONS WERE SCHEDULED TO BE NEARLY SIMULTANEOUS WITH ORBITER RANGING WHENEVER POSSIBLE, SO THAT THE ORBITER S- AND X-BAND DATA COULD SUPPLY THESE CORRECTIONS.

***** VIKING 1 LANDER, MUTC*****

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-075C-06 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL

TL - T.A. MUTC(DECEASED)	NASA HEADQUARTERS
TM - C. SAGAN	CORNELL U
TM - A.B. BINDER	U OF MICH
TM - E.C. MORRIS	US GEOLOGICAL SURVEY
TM - F.O. MUCK	NASA-LARC
TM - E.C. LEVINTHAL	STANFORD U
TM - S. LIEBES, JR.	STANFORD U
TM - J.B. POLLACK	NASA-ARC
TM - R.E. ARVIDSON	WASHINGTON U

BRIEF DESCRIPTION

THE LANDER IMAGING EXPERIMENT VIEWED THE SCENE SURROUNDING THE LANDER, THE SURFACE SAMPLER AND OTHER PARTS OF THE LANDER, THE SUN, PHOBOS, AND DEIMOS TO PROVIDE DATA FOR OPERATIONAL PURPOSES AND FOR GEOLOGICAL AND METEOROLOGICAL INVESTIGATIONS. TWO SCANNING CAMERAS, CAPABLE OF RESOLVING 0.04 DEG (HIGH-RESOLUTION) OR 0.12 DEG (LOW-RESOLUTION, COLOR, AND IR) WERE USED ON EACH LANDER. EACH IMAGE ACQUIRED COVERED A VERTICAL FIELD OF 20 DEG (HIGH-RESOLUTION) OR 60 DEG (LOW-RESOLUTION, COLOR, AND IR) AND A HORIZONTAL FIELD THAT WAS COMMANDABLE FROM 2.5 DEG TO 342.5 DEG IN 2.5-DEG INCREMENTS. IMAGES WERE ACQUIRED FROM 40 DEG ABOVE THE NOMINAL HORIZON TO 60 DEG BELOW, AND WERE COMMANDABLE IN 10-DEG INCREMENTS. THE CAMERAS WERE MOUNTED 1.3 M ABOVE THE NOMINAL LANDING PLANE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND MOST OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. THE TWO CAMERAS WERE SEPARATED BY 0.8 M, AND STEREOSCOPIC PICTURES WERE OBTAINED OVER MOST OF THE SCENE. BLACK-AND-WHITE IMAGES IN EITHER LOW OR HIGH RESOLUTION INCLUDED RADIATION WAVELENGTHS FROM 0.4 TO 1.1 MICROMETERS. THE USE OF A SINGLE DETECTOR TO IMAGE AN ENTIRE FRAME ALLOWED A RELATIVE RADIOMETRIC ACCURACY OF PLUS OR MINUS 10 PERCENT. FOR MORE INFORMATION CONCERNING THE CAMERAS, SEE MUCK ET AL., 'SPACE SCIENCE INSTRUMENTATION 1,' 189-241 (1975).

***** VIKING 1 ORBITER*****

SPACECRAFT COMMON NAME- VIKING 1 ORBITER
ALTERNATE NAMES- PL-733B, VIKING-B ORBITER
VIKING-B

NSSDC ID- 75-075A

LAUNCH DATE- 08/20/75 WEIGHT- 1170. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- AREOCENTRIC
ORBIT PERIOD- 1479. MIN
PERIAPSIS- 1513. KM ALT

EPOCH DATE- 06/21/76
INCLINATION- 37.9 DEG
APOAPSIS- 32600. KM ALT

PERSONNEL

MG - G.K. STROBEL
SC - J.M. BOYCE
PM - K.S. WATKINS
PS - C.W. SNYDER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE VIKING SPACECRAFT CONSISTED OF AN ORBITER AND A LANDER. THE LANDER SEPARATED FROM THE ORBITER, ENTERED THE MARTIAN ATMOSPHERE, AND SOFT-LANDED JULY 20, 1976. SCIENTIFIC DATA WERE COLLECTED AND TRANSMITTED TO EARTH FROM THE LANDER DURING ENTRY AND WHILE IT WAS ON THE SURFACE, AND FROM THE ORBITER BEFORE AND AFTER LANDER SEPARATION. THE ORBITER WAS A SOLAR-CELL-POWERED SATELLITE STABILIZED IN THREE AXES USING INERTIAL AND CELESTIAL REFERENCES. THERE WAS A 500-W POWER CAPACITY FOR THE ORBITER. IT CARRIED INSTRUMENTS FOR CONDUCTING IMAGING, ATMOSPHERIC WATER VAPOR, THERMAL MAPPING, AND RADIO SCIENCE INVESTIGATIONS. THE SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS HAD A MASS OF APPROXIMATELY 72 KG (158 LB). THE ORBITER WAS AN OCTAGON APPROXIMATELY 2.5 M ACROSS. THE EIGHT SIDES OF THE RING-LIKE STRUCTURE WERE .457 M HIGH AND WERE ALTERNATELY 1.4 AND 0.6 WIDE.

----- VIKING 1 ORBITER, CARR-----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-075A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. CARR
TM - J.A. BAUM
TM - H. MASURSKY
TM - G.A. BRIGGS
TM - J.A. CUTTS
TM - T.C. DUXBURY
TM - K.R. BLASIU
TM - R. GREELEY
TM - J.E. GUEST
TM - K.A. HOWARD
TM - B.A. SMITH
TM - L.A. SODERBLOM
TM - J. VEVERKA
TM - J.B. WELLMAN

US GEOLOGICAL SURVEY
LOWELL OBSERVATORY
US GEOLOGICAL SURVEY
NASA HEADQUARTERS
SCIENCE APPL, INC
NASA-JPL
SCIENCE APPL, INC
ARIZONA STATE U
U OF LONDON
US GEOLOGICAL SURVEY
U OF ARIZONA
US GEOLOGICAL SURVEY
CORNELL U
NASA-JPL

BRIEF DESCRIPTION

THE VIKING VISUAL IMAGING SUBSYSTEM (VIS) CONSISTED OF TWO HIGH-RESOLUTION, SLOW-SCAN TELEVISION FRAMING CAMERAS MOUNTED ON THE SCAN PLATFORM OF EACH ORBITER WITH THE OPTICAL AXES OFFSET BY 1.38 DEG. EACH OF THE TWO IDENTICAL CAMERAS ON EACH ORBITER HAD A 475-MM FOCAL LENGTH TELESCOPE; A 37-MM DIAMETER VIDICON, THE CENTRAL SECTION OF WHICH WAS SCANNED IN A RASTER FORMAT OF 1056 LINES BY 1182 SAMPLES; AND SIX COLOR FILTERS TO RESTRICT THE SPECTRAL BANDPASS OF AN IMAGE TO LIMITED PORTIONS OF THE NEAR-VISUAL RESPONSE CHARACTERISTICS. EACH FIELD OF VIEW WAS 1.54 DEG X 1.69 DEG WITH EACH PICTURE ELEMENT (PIXEL) SUBTENDING 25 MICRORADIANS. THE SLIGHT OFFSET OF THE OPTICAL AXES AND THE ALTERNATE SHUTTERING MODE OF OPERATION (THE INTERVAL BETWEEN FRAMES BEING 4.48 S) PROVIDED OVERLAPPING, WIDE-SWATH COVERAGE OF THE SURFACE. INDIVIDUAL IMAGES ARE IDENTIFIED BY PICTURE NUMBER (PICNO), WHICH IS A UNIQUE IDENTIFIER OF THE SCENE. ELEMENTS OF THE PICNO ARE AS FOLLOWS: THE FIRST THREE DIGITS DENOTE THE REVOLUTION (REV) DURING WHICH THE IMAGE WAS SHUTTERED; THE LETTER A IS VIKING ORBITER 1; B IS VIKING ORBITER 2; AND THE LAST TWO DIGITS ARE THE FRAME NUMBER.

----- VIKING 1 ORBITER, FARMER-----

INVESTIGATION NAME- MARS ATMOSPHERIC WATER DETECTION (MAWD)

NSSDC ID- 75-075A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - C.B. FARMER
TM - D.D. LAPORTE
TM - D.W. DAVIES

NASA-JPL
SANTA BARBARA RES CTR
NASA-JPL

BRIEF DESCRIPTION

THE MAWD USED AN INFRARED GRATING SPECTROMETER MOUNTED ON THE ORBITER SCAN PLATFORM THAT WAS BORESIGHTED WITH THE TELEVISION CAMERAS AND THE IRTM. THE INSTRUMENT MEASURED SOLAR INFRARED RADIATION REFLECTED FROM THE SURFACE THROUGH THE ATMOSPHERE TO THE SPACECRAFT. SPECTRAL INTERVALS WERE SELECTED COINCIDENT WITH THE WAVELENGTH OF WATER-VAPOUR ABSORPTION LINES IN THE 1.4-MICROMETER BAND. THE QUANTITY OF WATERVAPOUR ALONG THE LINE OF SIGHT WAS MEASURED FROM 1 TO 100 MICROMETERS OF PRECIPITABLE WATER WITH AN ACCURACY OF 5 PERCENT OR BETTER. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT WAS 2 X 17

MILLIRADIANS, AND A STEPPING MIRROR ROTATED THE LINE OF SIGHT THROUGH 15 POSITIONS TO PROVIDE A ROUGHLY RECTANGULAR FIELD OF VIEW OF 17 X 31 MILLIRADIANS.

----- VIKING 1 ORBITER, KIEFFER-----

INVESTIGATION NAME- INFRARED THERMAL MAPPING (IRTM)

NSSDC ID- 75-075A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. KIEFFER
TM - G. MUNCH
TM - E.D. MINER
TM - G. NEUGEBAUER
TM - S.C. CHASE, JR.
TM - F.D. PALLUONI

US GEOLOGICAL SURVEY
MPI-HEIDELBERG
NASA-JPL
CALIF INST OF TECH
SANTA BARBARA RES CTR
NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THE IRTM EXPERIMENT WAS TO MEASURE THE TEMPERATURES OF THE ATMOSPHERE AND AREAS ON THE SURFACE OF MARS. THE AMOUNT OF SUNLIGHT REFLECTED BY THE PLANET WAS ALSO MEASURED. THE IRTM WAS A MULTICHANNEL RADIOMETER MOUNTED ON THE ORBITER'S SCAN PLATFORM. FOUR SMALL TELESCOPES, EACH WITH SEVEN INFRARED DETECTORS, WERE AIMED PARALLEL TO THE VISUAL IMAGING OPTICAL AXIS, AND MADE OBSERVATIONS EVERY 1.12 S. THE INSTRUMENT WAS CAPABLE OF MEASURING DIFFERENCES OF 1 C THROUGHOUT A TEMPERATURE RANGE OF -130 DEG C TO +57 DEG C. THE FIELD OF VIEW WAS CIRCULAR, 5 MILLIRADIANS IN DIAMETER.

----- VIKING 1 ORBITER, MICHAEL, JR.-----

INVESTIGATION NAME- ORBITER RADIO SCIENCE

NSSDC ID- 75-075A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
METEOROLOGY

PERSONNEL

TL - W.H. MICHAEL, JR.
TM - I.I. SHAPIRO
TM - G.F. LINDAL
TM - J.G. DAVIES
TM - D.L. CAIN
TM - M.D. GROSSI
TM - G.L. TYLER
TM - J.P. BRENNLE
TM - R.H. TOLSON
TM - C.T. STELZRIED
TM - G. BORN
TM - R. REASENBERG

NASA-LARC
MASS INST OF TECH
NASA-JPL
U OF MANCHESTER
NASA-JPL
RAYTHEON CORP
STANFORD U
NASA-JPL
NASA-LARC
NASA-JPL
NASA-JPL
MASS INST OF TECH

BRIEF DESCRIPTION

THERE ARE FOUR DISTINCT SETS OF VIKING RADIO SCIENCE DATA, THREE USING ORBITER DATA AND ONE PRIMARILY USING LANDER DATA WITH CALIBRATIONS FROM ORBITER DATA. THE ORBITER TRACKING DATA, OBTAINED FROM THE TWO-WAY ORBITER-EARTH S-BAND AND X-BAND RADIO LINKS, CONSIST OF DOPPLER FREQUENCIES AND TIME-OF-FLIGHT RANGE MEASUREMENTS. THESE DETERMINED THE POSITION AND MOTION OF THE ORBITERS, AND CAN BE USED TO STUDY THE MARS GRAVITATIONAL FIELD, THE PLASMA IN INTERPLANETARY SPACE, AND THE STRUCTURE OF THE SOLAR CORONA. THE OCCULTATION DATA WERE OBTAINED FROM THESE SAME RADIO LINKS BY ANALOG RECORDING OF THE SIGNAL WHEN A SPACECRAFT WAS PASSING INTO OR OUT OF OCCULTATION WITH MARS. THE DATA CAN BE USED TO PRODUCE ALTITUDE PROFILES OF THE TEMPERATURE, DENSITY, AND PRESSURE OF THE ATMOSPHERE (INCLUDING THE IONOSPHERE) AND TO MEASURE THE RADIUS OF THE PLANET USING A LARGE NUMBER OF SURFACE POINTS. THE SURFACE PROPERTIES ASPECT OF THIS INVESTIGATION UTILIZED THE UHF (381 MHZ) SIGNAL ON WHICH THE LANDERS TRANSMITTED DATA TO THE ORBITERS. AT THE BEGINNING OR END OF A DATA TRANSMISSION SESSION, WHEN THE ORBITER WAS NEAR THE LANDER'S HORIZON, THE STRENGTH OF THE RECEIVED SIGNAL WAS RECORDED AS A FUNCTION OF TIME. THESE SIGNAL "FADING PATTERNS," RESULTING FROM INTERACTION OF THE RADIO WAVES WITH THE MARTIAN SURFACE, CONTAIN INFORMATION ABOUT THE PHYSICAL PROPERTIES OF THE SURFACE NEAR THE LANDERS. THE LANDER TRACKING DATA FROM THE TWO-WAY DIRECT LANDER-EARTH S-BAND LINKS PERMIT DETERMINATION OF THE LOCATION OF THE LANDERS AND STUDIES OF THE MOTION OF THE PLANET.

***** VOYAGER 1*****

SPACECRAFT COMMON NAME- VOYAGER 1

ALTERNATE NAMES- MARINER JUPITER/SATURN A, OUTER PLANETS A
MARINER 77A, MJS 77A
10321

NSSDC ID- 77-084A

LAUNCH DATE- 09/05/77 WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL
MG - F. CARR NASA HEADQUARTERS
SC - M.A. MITZ NASA HEADQUARTERS
PM - E.K. DAVIS NASA-JPL
PS - E.C. STONE CALIF INST OF TECH

BRIEF DESCRIPTION

THE OVERALL OBJECTIVES OF VOYAGER WERE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WAS PLACED ON COMPARATIVE STUDIES OF THESE TWO PLANETARY SYSTEMS BY OBTAINING (1) MEASUREMENTS OF THE ENVIRONMENT, ATMOSPHERE, AND BODY CHARACTERISTICS OF THE PLANETS AND THE SATELLITES OF EACH PLANET, (2) STUDIES OF THE NATURE OF THE RINGS OF SATURN, AND (3) EXPLORATION OF THE INTERPLANETARY (OR INTERSTELLAR) MEDIUM AT INCREASING DISTANCES FROM THE SUN. THESE OBJECTIVES WERE ATTAINED BY USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING IMAGING, A COHERENT S- AND X-BAND RF RECEIVER, AN INFRARED INTERFEROMETER AND RADIOMETER, UV SPECTROMETER, FLUXGATE MAGNETOMETERS, FARADAY CUPS, A CHARGED-PARTICLE ANALYZER, PLASMA DETECTOR, PLASMA-WAVE RADIO RECEIVER, COSMIC-RAY TELESCOPES, PHOTOPOLARIMETER, AND A SWEEP-FREQUENCY RADIO RECEIVER. VOYAGER 1 HAD ITS CLOSEST ENCOUNTER WITH JUPITER ON MARCH 5, 1979, AND WITH SATURN ON NOVEMBER 12, 1980.

----- VOYAGER 1, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-084A-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - M.S. BRIDGE MASS INST OF TECH
CI - J.W. BELCHER MASS INST OF TECH
CI - C.K. GOERTZ MPI-AERONOMY
CI - A.J. LAZARUS MASS INST OF TECH
CI - S. OLBERT MASS INST OF TECH
CI - V.M. VASYLIUNAS MPI-AERONOMY
CI - L.F. BURLAGA NASA-GSFC
CI - R.E. HARTLE NASA-GSFC
CI - K.W. OGILVIE NASA-GSFC
CI - G.L. SISCOE U OF CALIF, LA
CI - A.J. HUNDHAUSEN NATL CTR FOR ATMOS RES
CI - J.D. SULLIVAN MASS INST OF TECH
CI - J.D. SCUDDER NASA-GSFC

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MADE USE OF TWO FARADAY-CUP DETECTORS, ONE POINTED ALONG THE EARTH-SPACECRAFT LINE AND ONE AT RIGHT ANGLES TO THIS LINE. THE EARTH-POINTING DETECTOR DETERMINED THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WERE EMPLOYED WITH (DELTA E)/E EQUAL TO 20, 7.2, AND 1.8 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURED ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV.

----- VOYAGER 1, BROADFOOT-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- 77-084A-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - A.L. BROADFOOT U OF SOUTHERN CALIF
CI - M.W. MOOS JOHNS HOPKINS U
CI - M.J.S. BELTON KITTY PEAK NATL OBS
CI - D.F. STROBEL US NAVAL RESEARCH LAB
CI - T.M. DONAHUE U OF MICHIGAN
CI - M.B. MELROY HARVARD U
CI - J.C. MCCONNELL YORK U
CI - R.M. GOODY HARVARD U
CI - A. DALGARNO SAO
CI - J.E. BLAMONT CNRS-SA
CI - J.L. BERTAUD CNRS-SA
CI - S.K. ATHREYA U OF MICHIGAN
CI - B.R. SANDEL U OF SOUTHERN CALIF
CI - D.E. SNEWMANSKY U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE UV SPECTROMETER WAS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES, AND TO MEASURE RADIATION IN THE WAVELENGTH RANGE FROM 400 TO 1600 A. TWO MODES OF INSTRUMENT OPERATION WERE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION WAS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE-SCATTERED SOLAR RADIATION, WHERE THE SCATTERING IS BY MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS HYDROGEN (1216 A) OR HELIUM (584 A). IN THE OCCULTATION MODE, SUNLIGHT WAS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WAS RECORDED. AS THE ATMOSPHERE MOVED BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WERE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WAS USED TO IDENTIFY THE ABSORBER AS WELL AS TO MEASURE ITS ABUNDANCE IN THE LINE OF SIGHT TO THE SUN. IN ADDITION, THE ATMOSPHERIC THERMAL STRUCTURE COULD BE INFERRED.

----- VOYAGER 1, MANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-084A-03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - R.A. MANEL NASA-GSFC
CI - V.G. KUNDE NASA-GSFC
CI - D.P. CRUIKSHANK U OF HAWAII
CI - W.C. MAGUIRE NASA-GSFC
CI - J.C. PEARL NASA-GSFC
CI - J.A. PIRAGLIA NASA-GSFC
CI - R.E. SAMUELSON NASA-GSFC
CI - P.J. GIERASCH CORNELL U
CI - C.A. PONNAMPERUMA U OF MARYLAND
CI - D. GAUTIER PARIS OBSERVATORY
CI - F.M. FLASAR NASA-GSFC
CI - S. KUMAR U OF SOUTHERN CALIF
CI - B.J. CONRATH NASA-GSFC

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CARRIED OUT USING AN INFRARED RADIOMETER AND AN INTERFEROMETER-SPECTROMETER SIMILAR IN DESIGN TO THE MARINER MARS-71 IRIS, COMBINED INTO A SINGLE INSTRUMENT. THE INVESTIGATION STUDIED BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WAS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H₂/HE RATIO, AND THE ABUNDANCE OF CH₄ AND NH₃. VERTICAL TEMPERATURE PROFILES WERE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WERE CONDUCTED. THE INTERFEROMETER HAD A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE COVERED 5000 TO 33,000 1/CM. THE INSTRUMENT USED A SINGLE PRIMARY MIRROR 51 CM IN DIAM WITH A FIELD OF VIEW OF 0.25 DEG.

----- VOYAGER 1, KRIMIGIS-----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- 77-084A-07 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - S.M. KRIMIGIS APPLIED PHYSICS LAB
CI - C.V. FAN U OF ARIZONA
CI - G. GLOECKLER U OF MARYLAND
CI - L.J. LANZEROTTI BELL TELEPHONE LAB
CI - T.P. ARMSTRONG U OF KANSAS
CI - W.I. AXFORD MPI-AERONOMY
CI - C.O. BOSTROM APPLIED PHYSICS LAB
CI - E.P. KEATH APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN, USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MADE MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND BOW SHOCK OF JUPITER, (2) THE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED-RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR WAS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WAS 10 KEV TO 1.1 MEV FOR ELECTRONS AND 10 KEV TO 150 MEV FOR IONS. DURING THE INTERPLANETARY CRUISE PERIOD, PROTONS, ALPHA PARTICLES, AND HEAVIER NUCLEI (Z FROM 3 TO 26) WERE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 1, NESS-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- 77-084A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - M.F. NESS
CI - M.H. ACUNA
CI - K.W. BENANNON
CI - L.F. DURLAGA
CI - R.P. LEPPING
CI - F.M. NEUBAUER

NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO INVESTIGATE THE MAGNETIC FIELDS OF JUPITER AND SATURN, THE SOLAR-WIND INTERACTION WITH THE MAGNETOSPHERES OF THESE PLANETS, AND THE INTERPLANETARY MAGNETIC FIELD OUT TO THE SOLAR WIND BOUNDARY WITH THE INTERSTELLAR MAGNETIC FIELD AND BEYOND, IF CROSSED. THE INVESTIGATION WAS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WAS PLUS OR MINUS 0.1 NT, AND THE RANGE OF MEASUREMENTS WAS FROM 0.01 NT TO 2.5-3 T.

----- VOYAGER 1, SCARF-----

INVESTIGATION NAME- PLASMA WAVE (.01-56 KHZ)

NSSDC ID- 77-084A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
PLANETARY IONOSPHERES

PERSONNEL

PI - F.L. SCARF
CI - D.A. GURNETT

TRW SYSTEMS GROUP
U OF IOWA

BRIEF DESCRIPTION

THIS INVESTIGATION PROVIDED CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON-DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GAVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTION REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTED OF A 16-CHANNEL, STEP-FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER, WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WAS FROM 10 KHZ TO 56 KHZ. THIS INSTRUMENT SHARED THE 10-M ANTENNAS DEVELOPED FOR THE INVESTIGATION OF PLANETARY RADIO ASTRONOMY.

----- VOYAGER 1, SMITH-----

INVESTIGATION NAME- IMAGING

NSSDC ID- 77-084A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
PLANETOLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

TL - M.A. SMITH
DT - L.A. SODERBLOM
TM - G.A. BRIGGS
TM - A.F. COOK
TM - G.E. DANIELSON
TM - M.E. DAVIES
TM - G.E. HUNT
TM - T. OWEN
TM - C. SAGAN
TM - V.E. SUOMI
TM - T.V. JOHNSON
TM - M. MASURSKY

U OF ARIZONA
US GEOLOGICAL SURVEY
NASA HEADQUARTERS
SAO
CALIF INST OF TECH
RAND CORP
U COLLEGE LONDON
STATE U OF NEW YORK
CORNELL U
U OF WISCONSIN
NASA-JPL
US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PHOTOGRAPHIC EXPERIMENT USED A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 SYSTEM. THIS SYSTEM INCLUDED ONE NARROW-ANGLE, LONG-FOCAL-LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT-FOCAL-LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDED ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT THE RESOLUTION WAS AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION WAS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WERE TO PHOTOGRAPH: GLOBAL MOTIONS AND CLOUD DISTRIBUTIONS ON JUPITER AND SATURN, GROSS DYNAMICAL PROPERTIES, ZONAL ROTATION, ORIENTATION OF SPIRALS, ZONAL SHEAR, VERTICAL SHEAR, FLOW INSTABILITIES, SPOTS, AND SPECTRUM OF SCALE OF ATMOSPHERIC MOTIONS IN TIME AND SPACE. ADDITIONAL OBJECTIVES INCLUDED THE STUDY OF THE MODE OF RELEASE OF INTERNAL ENERGY (LUX (SEARCH FOR CONVECTION CELLS AND ROLLS), STUDY OF GROWTH, DISSIPATION, MORPHOLOGY, AND VERTICAL

STRUCTURE OF CLOUD COMPLEXES, GROSS OPTICAL PROPERTIES, GLOBAL AND LOCALIZED SCATTERING FUNCTION IN THE VISIBLE SPECTRUM, POLARIMETRY, NATURE OF CIRCUMPHORES (THEIR STRUCTURE AND DEVELOPMENT), AND HIGH RESOLUTION OF THE GREAT RED SPOT. THE OBJECTIVES OF THE SATELLITE ENCOUNTERS INCLUDED THE FOLLOWING: (1) GROSS CHARACTERISTICS - SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPROVED EPHEMERIDES AND MASSES, (2) GEOLOGY - MAJOR PHYSIOGRAPHIC PROVINCES, IMPACT AND VOLCANIC FEATURES, LINEMENTS, POLAR CAPS, EROSION PROCESSES, AND LOW- AND HIGH-DENSITY SATELLITE COMPARATIVE STUDIES, DETECTION OF ATMOSPHERES, FROSTS, AND LIMB STRATIFICATION OF AEROSOLS, (3) SURFACE PROPERTIES - COLORIMETRY, SCATTERING FUNCTION, NATURE OF BRIGHTNESS VARIATION, AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS INCLUDED: (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OR CLUMPS OF MATERIAL, (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL AT VERY HIGH RESOLUTION, (3) SCATTERING FUNCTION, (4) COARSE POLARIMETRY, (5) OCCULTATION - OPTICAL DEPTH, AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WERE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- VOYAGER 1, TYLER-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 77-084A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - G.L. TYLER
CI - V.H. ESHLEMAN
CI - J.H. ANDERSON
TM - T.A. CROFT
TM - G.P. LINDAL
TM - G.S. LEVY
TM - G.E. WOOD

STANFORD U
STANFORD U
NASA-JPL
SRI INTERNATIONAL
NASA-JPL
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USED THE TELECOMMUNICATIONS SYSTEM OF THE VOYAGER SPACECRAFT TO PERFORM ITS STUDIES. THE SYSTEM WAS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION WERE (1) TO DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL DURING IMMERSION AND EMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) TO DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS, AND DENSITIES BY PRECISE TRACKING OF A DUAL-FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) TO DETERMINE THE AMOUNT AND SIZE DISTRIBUTION OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL THAT PASSED THROUGH EACH RING IN SUCCESSION, AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

----- VOYAGER 1, VOGT-----

INVESTIGATION NAME- HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE

NSSDC ID- 77-084A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. VOGT
CI - J.R. JOKEPPI
CI - E.C. STONE
CI - F.B. McDONALD
CI - J.H. TRAINER
CI - M.R. WEBBER
CI - A.W. SCHARDT

CALIF INST OF TECH
U OF ARIZONA
CALIF INST OF TECH
NASA-GSFC
NASA-GSFC
U OF NEW HAMPSHIRE
NASA-GSFC

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIED THE ORIGIN AND ACCELERATION PROCESS, LIFE HISTORY, AND DYNAMIC CONTRIBUTION OF INTERSTELLAR COSMIC RAYS, THE NUCLEOSYNTHESIS OF ELEMENTS IN COSMIC-RAY SOURCES, THE BEHAVIOR OF COSMIC RAYS IN THE INTERPLANETARY MEDIUM, AND THE TRAPPED PLANETARY ENERGETIC-PARTICLE ENVIRONMENT. THE INSTRUMENTATION INCLUDED A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERED AN ENERGY RANGE BETWEEN 6 AND 500 MEV/NUCLEON FOR NUCLEI RANGING IN ATOMIC NUMBERS FROM 1 THROUGH 30. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON WERE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURED THE ENERGY AND DETERMINED THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURED THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON WERE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 1, WARWICK-----

INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- 77-084A-10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - J.W. WARWICK	RADIOPHYSICS, INC
CI - J.K. ALEXANDER, JR.	NASA-GSFC
CI - T.D. CARR	U OF FLORIDA
CI - F.T. HARDOCK	U OF MICHIGAN
CI - D.M. STAELIN	MASS INST OF TECH
CI - A. BOISCHOT	PARIS OBSERVATORY
CI - C.C. HARVEY	PARIS OBSERVATORY
CI - V. LEBLANC	PARIS OBSERVATORY
CI - W.E. BROWN, JR.	NASA-JPL
CI - S. GULKIS	NASA-JPL
CI - R. PHILLIPS	NASA-JPL
CI - J.B. PEARCE	RADIOPHYSICS, INC
CI - A.C. RIDDLE	U OF COLORADO
CI - R.G. PELTZER	MARTIN-MARIETTA AEROSP
CI - M.L. KAISER	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KMZ AND 40.5 MHZ. THE SIGNAL WAS RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. STUDY OF THE RADIO-EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES YIELDED DATA CONCERNING THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NONTHERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS.

***** VOYAGER 2*****

SPACECRAFT COMMON NAME- VOYAGER 2

ALTERNATE NAMES- MARINER JUPITER/SATURN B, OUTER PLANETS B
MARINER 77B, MJS 77B
10271

NSSDC ID- 77-076A

LAUNCH DATE- 08/20/77 WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- SATURN FLYBY

PERSONNEL

MG - F. CARR	NASA HEADQUARTERS
SC - M.A. MITZ	NASA HEADQUARTERS
PM - E.K. DAVIS	NASA-JPL
PS - E.C. STONE	CALIF INST OF TECH

BRIEF DESCRIPTION

THE OVERALL OBJECTIVES OF VOYAGER 2 WERE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN AND POSSIBLY ON TO URANUS. PRIMARY EMPHASIS WAS PLACED ON COMPARATIVE STUDIES OF THESE TWO PLANETARY SYSTEMS BY OBTAINING (1) MEASUREMENTS OF THE ENVIRONMENT, ATMOSPHERE, AND LODY CHARACTERISTICS OF THE PLANETS AND ONE OR MORE OF THE SATELLITES OF EACH PLANET, (2) STUDIES OF THE NATURE OF THE RINGS OF SATURN, AND (3) EXPLORATION OF THE INTERPLANETARY (OR INTERSTELLAR) MEDIUM AT INCREASING DISTANCES FROM THE SUN. THESE OBJECTIVES WERE MET USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING IMAGING, A COHERENT S- AND X-BAND RF RECEIVER, AN IR INTERFEROMETER AND RADIOMETER, A UV SPECTROMETER, FLUORATE MAGNETOMETERS, FARADAY CUP, A CHARGED-PARTICLE ANALYZER, PLASMA DETECTOR, PLASMA-WAVE RADIO RECEIVER, COSMIC-RAY TELESCOPES, PHOTOPOLARIMETER, AND A SWEEP-FREQUENCY RADIO RECEIVER. JUPITER CLOSE ENCOUNTER WAS ACHIEVED ON JULY 9, 1979.

----- VOYAGER 2, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-076A-06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - M.S. BRIDGE	MASS INST OF TECH
CI - A.J. LAZARUS	MASS INST OF TECH
CI - S. OLIVER	MASS INST OF TECH
CI - J.W. BELCHER	MASS INST OF TECH
CI - V.M. VASYLIUNAS	RPI-AERONOMY
CI - L.F. BURLAGA	NASA-GSFC
CI - C.K. GOERTZ	RPI-AERONOMY
CI - G.L. SISCOE	U OF CALIF, LA
CI - A.J. HUNDHAUSEN	NATL CTR FOR ATMOS RES

CI - R.E. HARTLE	NASA-GSFC
CI - K.W. OGILVIE	NASA-GSFC
CI - J.D. SULLIVAN	MASS INST OF TECH
CI - J.D. SCUBBER	NASA-GSFC

NASA-GSFC
NASA-GSFC
MASS INST OF TECH
NASA-GSFC

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MADE USE OF TWO FARADAY-CUP DETECTORS, ONE POINTED ALONG THE EARTH-SPACECRAFT LINE AND ONE AT RIGHT ANGLES TO THIS LINE. THE EARTH-POINTING DETECTOR DETERMINED THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WERE EMPLOYED WITH (DELTA E)/E EQUAL TO 29, 7.2, AND 1.0 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURED ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV.

----- VOYAGER 2, BROADFOOT-----

INVESTIGATION NAME ULTRAVIOLET SPECTROSCOPY

NSSDC ID- 77-076A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. BROADFOOT	U OF SOUTHERN CALIF
CI - A. DALGARNO	SAO
CI - J.C. MCCONNELL	YORK U
CI - R.W. GOODY	HARVARD U
CI - T.M. DONAHUE	U OF MICHIGAN
CI - M.B. MCLEROY	HARVARD U
CI - M.J.S. BELTON	KITT PEAK NATL OBS
CI - D.F. STROBEL	US NAVAL RESEARCH LAB
CI - M.W. ROOS	JOHNS HOPKINS U
CI - J.E. BLAMONT	CNRS-SA
CI - J.L. BERTAUD	CNRS-SA
CI - S.K. ATHREYA	U OF MICHIGAN
CI - B.R. SANDEL	U OF SOUTHERN CALIF
CI - D.E. SHERANSKY	U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE UV SPECTROMETER WAS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURED RADIATION IN THE WAVELENGTH RANGE 400 TO 1600 A. TWO MODES OF INSTRUMENT OPERATION WERE PLANNED: AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE, THE ATMOSPHERIC RADIATION WAS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE-SCATTERED SOLAR RADIATION, WHERE THE SCATTERING IS BY THE MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS, FOR EXAMPLE, HYDROGEN (1216 A) OR HELIUM (584 A). IN THE OCCULTATION MODE, SUNLIGHT WAS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WAS RECORDED. AS THE ATMOSPHERE MOVED BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WERE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WAS USED TO IDENTIFY THE ABSORBER AS WELL AS TO MEASURE ITS ABUNDANCE IN THE LINE OF SIGHT TO THE SUN. IN ADDITION, THE ATMOSPHERE'S THERMAL STRUCTURE COULD BE INFERRED.

----- VOYAGER 2, HANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-076A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETA ATMOSPHERES

PERSONNEL

PI - R.A. HANEL	NASA-GSFC
CI - C.A. PONNAMPERUMA	U OF MARYLAND
CI - P.J. GIERASCH	CORNELL U
CI - J.A. PIRAGLIA	NASA-GSFC
CI - R.E. SAMUELSON	NASA-GSFC
CI - M.C. MAGUIRE	NASA-GSFC
CI - J.C. PEARL	NASA-GSFC
CI - V.G. KUNDE	NASA-GSFC
CI - D.P. CRUIKSHANK	U OF HAWAII
CI - B.J. CONRATH	NASA-GSFC
CI - D. GAUTIER	PARIS OBSERVATORY
CI - F.M. FLAHER	NASA-GSFC
CI - S. KUMAR	U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CARRIED OUT USING AN INFRARED RADIOMETER AND AN INTERFEROMETER SPECTROMETER SIMILAR IN DESIGN TO THE MARINER MARS-71 IRIS, COMBINED INTO A SINGLE INSTRUMENT. THE INVESTIGATION STUDIED BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WAS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H2/HE RATIO AND THE ABUNDANCE OF CH4 AND NH3. VERTICAL TEMPERATURE PROFILES WERE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WERE CONDUCTED. THE INTERFEROMETER HAD A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE COVERED 5000 TO 33,000 1/CM. THE INSTRUMENT USED A SINGLE PRIMARY MIRROR 51 CM IN DIAM WITH A FIELD OF VIEW OF 0.25 DEG.

----- VOYAGER 2, KRIMIGIS -----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSDDC ID- 77-076A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS
CI - C.O. POSTROM
CI - T.P. ARMSTRONG
CI - W.J. ARFORD
CI - G. GLOCKLER
CI - L.J. LANZEROTTI
CI - C.V. FAN
CI - E.P. KEATH

APPLIED PHYSICS LAB
APPLIED PHYSICS LAB
U OF KANSAS
MPI-AERONAUTICS
U OF MARYLAND
BELL TELEPHONE LAB
U OF ARIZONA
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN, USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MADE MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND BOW SHOCK OF JUPITER, (2) THE MAGNETOSPHERE OF SATURN AND POSSIBLE MAGNETOSPHERE OF URANUS, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR WAS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WAS 10 KEV TO 1.1 MEV FOR ELECTRONS AND 10 KEV TO 150 MEV FOR IONS. DURING THE INTERPLANETARY CRUISE PERIOD, PROTONS, ALPHA PARTICLES, AND HEAVIER NUCLEI (Z FROM 3 TO 26) WERE SEPARATELY IDENTIFIED AND THEIR ENERGIES MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 2, LANE -----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 A

NSDDC ID- 77-076A-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. LANE
CI - K. PANG
CI - J.E. HANSEN
CI - D.L. COFFLEEN
CI - L. ESPOSITO
CI - M. SATO
CI - M. WEST
CI - C.W. MORD

NASA-JPL
NASA-JPL
NASA-GISS
NASA-GISS
U OF COLORADO
NASA-GISS
U OF COLORADO
U OF COLORADO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN 8-IN. (20-CM) F/1.1 TELESCOPE THAT SENT RADIATION THROUGH A POLARIZER AND A FILTER FOR ONE OF EIGHT BANDS IN THE 2200- TO 7300-A SPECTRAL REGION, THEN ON TO A PHOTOMULTIPLIER TUBE. BY STUDY OF THESE EMISSION INTENSITY DATA, INFORMATION ON SURFACE TEXTURE AND COMPOSITION OF BOTH JUPITER AND SATURN COULD BE OBTAINED, ALONG WITH INFORMATION OF SIZE DISTRIBUTION AND COMPOSITION OF SATURN'S RINGS AND INFORMATION ON ATMOSPHERIC SCATTERING PROPERTIES AND DENSITY FOR BOTH PLANETS. MOLECULAR SCALE HEIGHT, FOR BOTH PLANETS COULD ALSO BE DETERMINED FROM THESE DATA.

----- VOYAGER 2, NESS -----

INVESTIGATION NAME- TRIAXIAL FLURGATE MAGNETOMETERS

NSDDC ID- 77-076A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - M.J. NESS
CI - R.P. LIPPING
CI - F.M. NEUMAUER
CI - K.W. DEHANNON
CI - L.P. BURLAGA
CI - M.H. ALLEN

NASA-USFC
NASA-USFC
BRAUNSCHEWIG TECH U
NASA-USFC
NASA-USFC
NASA-USFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO INVESTIGATE (1) THE MAGNETIC FIELDS OF JUPITER, SATURN, AND URANUS; AND (2) THE SOLAR-WIND INTERACTION OF THE MAGNETOSPHERES OF THESE PLANETS WITH THE INTERPLANETARY MAGNETIC FIELD OUT TO THE SOLAR-WIND BOUNDARY WITH THE INTERSTELLAR MAGNETIC FIELD, AND BEYOND, IF CROSSED. THE INVESTIGATION WAS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLURGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WAS PLUS OR MINUS 0.1 NT, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 NT TO 2.1-5 T.

----- VOYAGER 2, SCARF -----

INVESTIGATION NAME- PLASMA WAVE (0.01-96 KHZ)

NSDDC ID- 77-076A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.L. SCARF
CI - L.A. GURNETT

TRW SYSTEMS GROUP
U OF IOWA

BRIEF DESCRIPTION

THIS INVESTIGATION PROVIDED CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GAVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTIONS REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTED OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WAS FROM 10 HZ TO 96 KHZ. THIS INSTRUMENT SHARED THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 2, SMITH -----

INVESTIGATION NAME- IMAGING

NSDDC ID- 77-076A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - B.A. SMITH
CI - L.A. SODERBLOM
CI - G.A. BRIGGS
CI - A.P. COOK
CI - G.E. DANIELSON
CI - H.E. DAVIES
CI - G.E. HUNT
CI - T. OWEN
CI - C. SAGAN
CI - V.E. SUOMI
CI - L.V. JOHNSON
CI - M. MASURSKY

U OF ARIZONA
US GEOLOGICAL SURVEY
NASA HEADQUARTERS
SAO
CALIF INST OF TECH
RAND CORP
U COLLEGE LONDON
STATE U OF NEW YORK
CORNELL U
U OF WISCONSIN
NASA-JPL
US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PHOTOGRAPHIC EXPERIMENT USED A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 SYSTEM. THIS SYSTEM INCLUDED ONE NARROW-ANGLE, LONG-FOCAL-LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT-FOCAL-LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDS GREATLY ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT WAS AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS AT JUPITER AND SATURN. THE RESOLUTION WAS EXPECTED TO BE 20 TO 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WERE TO PHOTOGRAPH GLOBAL MOTIONS AND CLOUD DISTRIBUTIONS ON JUPITER AND SATURN, GROSS DYNAMICAL PROPERTIES, ZONAL ROTATION, ORIENTATION OF SPIN AXIS, ZONAL SHEAR, VERTICAL SHEAR, FLOW INSTABILITIES, SPOTS, AND SPECTRUM OF SCALE OF ATMOSPHERIC MOTIONS IN TIME AND SPACE. ADDITIONAL OBJECTIVES INCLUDED THE STUDY OF THE MODE OF RELEASE OF INTERNAL ENERGY FLUX (SEARCH FOR CONVECTION CELLS AND ROLLS), STUDY OF GROWTH, DISSEMINATION, MORPHOLOGY, AND VERTICAL STRUCTURE OF CLOUD COMPLEXES, GROSS OPTICAL PROPERTIES, GLOBAL AND LOCALIZED SCATTERING FUNCTION IN THE VISIBLE SPECTRUM, POLARIMETRY, NATURE OF CIRCUMPHORES (THEIR STRUCTURE AND DEVELOPMENT), AND HIGH RESOLUTION OF THE GREAT RED SPOT. THE OBJECTIVES OF THE SATELLITE ENCOUNTERS INCLUDED (1) GROSS CHARACTERISTICS -- SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPROVED EPHEMERIDES AND MAPS; (2) GEOLOGY -- MAJOR PHYSIOGRAPHIC PROVINCES, IMPACT AND VOLCANIC FEATURES, LINEAMENTS, POLAR CAPS, EROSION PROCESSES, AND LOW- AND HIGH-DENSITY SATELLITE COMPARATIVE STUDIES, DETECTION OF ATMOSPHERES, FROSTS, AND LIND STRATIFICATION OF AEROSOLS; (3) SURFACE PROPERTIES -- COLORIMETRY, SCATTERING FUNCTION, NATURE OF BRIGHTNESS VARIATION, AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS WERE CARRIED OUT. OBJECTIVES INCLUDED (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OF CLUMPS OF MATERIAL; (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL AT VERY HIGH RESOLUTION; (3) SCATTERING FUNCTION; (4) COARSE POLARIMETRY; (5) OCCULTATION -- OPTICAL DEPTH; AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WERE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- VOYAGER 2, TYLER -----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSDDC ID- 77-076A-2

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - G.L. TYLER
TM - G.F. LINDAL
TM - G.S. LEVY
TM - T.A. CROFT
TM - V.N. ESMLERAN
TM - J.D. ANDERSON
TM - G.E. WOOD

STANFORD U
NASA-JPL
NASA-JPL
SRI INTERNATIONAL
STANFORD U
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USED THE TELECOMMUNICATIONS SYSTEMS OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WAS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION WERE (1) TO DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL DURING IMMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) TO DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS AND DENSITIES BY PRECISE TRACKING OF A DUAL-FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) TO DETERMINE THE AMOUNT AND SIZE DISTRIBUTIONS OF MATERIAL IN THE RINGS OF SATURN AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION AND THROUGH THE GAP BETWEEN THE C RING AND THE SURFACE OF SATURN.

----- VOYAGER 2, VOGT-----

INVESTIGATION NAME- HIGH- AND MODERATELY LOW-ENERGY
COSMIC-RAY TELESCOPE

NSDDC ID- 77-076A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. VOGT
CI - J.R. JOKIPII
CI - E.C. STONE
CI - F.B. McDONALD
CI - J.H. TRAINER
CI - W.R. WEBBER
CI - A.W. SCHARDT

CALIF INST OF TECH
U OF ARIZONA
CALIF INST OF TECH
NASA-GSFC
NASA-GSFC
U OF NEW HAMPSHIRE
NASA-GSFC

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIED THE ORIGIN AND ACCELERATION PROCESSES, LIFE HISTORY, AND DYNAMIC CONTRIBUTION OF INTERSTELLAR COSMIC RAYS, THE NUCLEOSYNTHESIS OF ELEMENTS IN COSMIC-RAY SOURCES, THE BEHAVIOR OF COSMIC RAYS IN THE INTERPLANETARY MEDIUM, AND THE TRAPPED PLANETARY ENERGETIC PARTICLE ENVIRONMENT. THE INSTRUMENTATION INCLUDED A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERED AN ENERGY RANGE BETWEEN 6 AND 500 MEV/NUCLEON FOR NUCLEI RANGING IN ATOMIC NUMBERS FROM 1 THROUGH 30. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV WERE MEASURED BY THIS TELESCOPE AND AN ELI TRON TELESCOPE (ET). THE LETS MEASURED THE ENERGY AND DETERMINED THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURED THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV WERE MEASURED BY AN ELECTRON TELESCOPE (ET).

----- VOYAGER 2, WARWICK-----

INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY

NSDDC ID- 77-076A-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - J.W. WARWICK
CI - W.F. BROWN, JR.
CI - S. GULKIS
CI - C.C. HARVEY
CI - V. LEMLANC
CI - D.W. STALLIN
CI - A. BOISCHOT
CI - T.D. CARR
CI - F.T. HADDOCK
CI - J.R. ALEXANDER, JR.
CI - R. PHILLIPS
CI - R.G. PELTZER
CI - J.D. PLANCE
CI - A.C. RIDDLE
CI - W.L. KAISER

RADIOPHYSICS, INC.
NASA-JPL
NASA-JPL
PARIS OBSERVATORY
PARIS OBSERVATORY
MASS INST OF TECH
PARIS OBSERVATORY
U OF FLORIDA
U OF MICHIGAN
NASA-GSFC
NASA-JPL
MARTIN-MARIETTA AEROSP
RADIOPHYSICS, INC
U OF COLORADO
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHz AND 40.5 MHz. THE SIGNAL WAS RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NONTHERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS WAS STUDIED BY INVESTIGATION OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES.

3

**DESCRIPTIONS OF PLANNED SPACECRAFT
AND EXPERIMENTS**

C-2

3. DESCRIPTIONS OF PLANNED SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments pertinent to this report that were planned as of May 31, 1981, had progressed beyond the experiment or investigation selection stage, and for which NSSDC has at least minimal documentation. A few changes subsequent to this date may appear, depending on availability. The descriptions are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. If the common name, as used by NSSDC, is not known, it can be found by referring to an alternate name found in the Index of Active and Planned Spacecraft and Experiments (Section 4).

Each spacecraft or experiment entry in this section is composed of two parts, a heading and brief description. The headings list characteristics of spacecraft and experiments. Many of the terms used in this section are defined in Appendix C.

3.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of planned initial orbit parameters: orbit type, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, or probe missions. In addition, the heading contains the spacecraft weight, launch date (as provided by the project office; actual date may change), site, vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel codes as follows:

CODE CO (general contact)
CODE MG (program manager)
CODE MM (mission manager)
CODE MO (mission operations manager)
CODE MS (mission scientist)
CODE PC (project coordinator)
CODE PD (project director)
CODE PE (project engineer)
CODE PM (project manager)
CODE PS (project scientist)
CODE SC (program scientist)
CODE TD (technical director)

This terminology is standard for NASA missions; the equivalent functions for the missions of other countries or agencies have been given the same position names. The spacecraft brief description is immediately below each heading.

3.2 Contents of Experiment Entries

Each experiment entry heading includes the experiment name, the NSSDC ID code, the investigative program, the investigation discipline, and the name and affiliation or location of the principal investigator (PI) or team leader (TL) for the experiment as well as other investigators (OI), team members (TM),

deputy team leader (DT), co-investigator (CI), experiment manager (EM), experiment scientist (ES), or general contact (CO) associated with the experiment. The investigators are not listed in any particular order within each experiment. The experiment brief description is immediately below each heading.

The investigative program may include one of the following NASA Headquarters division codes:

- CODE EB (Environmental Observations)
- CODE EC (Communications)
- CODE EM (Space Processing)
- CODE ER (Resource Observations)
- CODE RS (Space Systems)
- CODE SB (Life Sciences)
- CODE SC (Astrophysics)
- CODE SL (Planetary)
- CODE ST (Solar Terrestrial)

The addition of /CO-OP to any code indicates a cooperative effort between NASA and another agency.

3.3 Planned Spacecraft and Experiment Descriptions

A spacecraft is included in the planned section of this report if it is an approved or a proposed mission where the experiments or investigations have already been selected.

***** ASTRO-B*****

SPACECRAFT COMMON NAME- ASTRO-B
ALTERNATE NAMES- X-RAY OBSERVATION SAT.

NSSDC ID- ASTRO-B

LAUNCH DATE- 02/00/83
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- N-35

WEIGHT- 220. KG

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96. MIN INCLINATION- 30. DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL
PM - Y. TANAKA U OF TOKYO
PS - J. NISHIMURA U OF TOKYO

BRIEF DESCRIPTION
THIS IS AN X-RAY ASTRONOMY MISSION WITH THE FOLLOWING MAJOR OBJECTIVES: (1) STUDY OF X-RAY SOURCE SPECTRA WITH GOOD ENERGY RESOLUTION, (2) STUDY OF TEMPORAL VARIATIONS OF X-RAY SOURCES, (3) ALL-SKY SURVEY FOR X-RAY BURSTS AND TRANSIENTS, AND (4) OBSERVATION OF SOFT X-RAY SOURCES WITH A REFLECTING TELESCOPE. THE SPACECRAFT SPINS AT 0.1 RPM WITH THE AID OF A MOMENTUM WHEEL. THE SPIN AXIS CAN BE MANEUVERED BY MAGNETIC TORQUING.

----- ASTRO-B, MIYAMOTO-----

INVESTIGATION NAME- HADAMARD TRANSFORM TELESCOPE

NSSDC ID- ASTRO-B-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S. MIYAMOTO OSAKA U
OI - K. YAMASHITA OSAKA U
OI - H. TSUNEMI OSAKA U

BRIEF DESCRIPTION
A WIDE-ANGLE FIELD-OF-VIEW HADAMARD TRANSFORM TELESCOPE LOOKING PARALLEL TO THE SPACECRAFT SPIN AXIS MONITORS X-RAY BURSTS AND TRANSIENTS.

----- ASTRO-B, MIYAMOTO-----

INVESTIGATION NAME- ALL SKY X-RAY MONITOR

NSSDC ID- ASTRO-B-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S. MIYAMOTO OSAKA U
OI - K. YAMASHITA OSAKA U
OI - H. TSUNEMI OSAKA U

BRIEF DESCRIPTION
A PAIR OF PROPORTIONAL COUNTERS WITH A FAN-BEAM FIELD OF VIEW IS USED ON THE SPINNING SPACECRAFT TO PROVIDE AN ALL-SKY MONITOR.

----- ASTRO-B, TANAKA-----

INVESTIGATION NAME- GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC)

NSSDC ID- ASTRO-B-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - Y. TANAKA U OF TOKYO
OI - M. MATSUOKA U OF TOKYO
OI - Y. OGAWARA U OF TOKYO
OI - T. MURAKAMI U OF TOKYO
OI - K. KOTANI U OF TOKYO
OI - M. INOUE U OF TOKYO
OI - K. MAKISHIMA U OF TOKYO
OI - T. OHASHI U OF TOKYO

BRIEF DESCRIPTION
A CLUSTER OF GAS SCINTILLATION PROPORTIONAL COUNTERS HAVING AN EFFECTIVE AREA OF 1000 SQ CM IS USED TO OBTAIN THE ENERGY SPECTRA OF X-RAY SOURCES WITH AN ENERGY RESOLUTION THAT IS A FACTOR OF 2 BETTER THAN THAT OF CONVENTIONAL PROPORTIONAL COUNTERS.

----- ASTRO-B, YAMASHITA-----

INVESTIGATION NAME- X-RAY REFLECTING TELESCOPE

NSSDC ID- ASTRO-B-04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - K. YAMASHITA OSAKA U
OI - F. WAKINO NAGOYA U
OI - F. NAGAIH NAGOYA U

BRIEF DESCRIPTION
A ONE-DIMENSIONAL REFLECTING TELESCOPE IS POINTED ALONG THE SPACECRAFT SPIN AXIS. THE FOCAL LENGTH OF THE TELESCOPE IS 60 CM AND THE EFFECTIVE AREA IS 40 SQ CM.

***** CCE*****

SPACECRAFT COMMON NAME- CCE
ALTERNATE NAMES- AMPTE/CHARGE COMP EXPL, CHARGE COMPOSITION EXP

NSSDC ID- CCE

LAUNCH DATE- 00/00/84 WEIGHT- 140. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-053

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 950. MIN INCLINATION- 2. DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 51000. KM ALT

PERSONNEL
MG - M.B. WEINKER NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - G.W. OUSLEY NASA-GSFC
PS - M.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION
THE PURPOSES OF THIS MISSION ARE TO STUDY THE ACCESS OF SOLAR-WIND IONS TO THE MAGNETOSPHERE AND THE CONVECTIVE-DIFFUSIVE TRANSPORT AND ENERGIZATION OF MAGNETOSPHERIC PARTICLES. THE PROGRAM CONSISTS OF THIS SPACECRAFT AND THE ION SPACECRAFT, USED TO PROVIDE MULTIPLE ION RELEASES, WHICH ARE DETECTED BY INSTRUMENTS ON THE CCE. THE SPACECRAFT IS POWERED BY FOUR SOLAR-CELL PANELS THAT PROVIDE 140 W, AND HAS A BATTERY. THE SPACECRAFT IS SPIN STABILIZED AT 10 RPM WITH THE SPIN AXIS IN THE ORBIT PLANE. THE ATTITUDE SYSTEM CONSISTS OF A SUN SENSOR AND A 3-AXIS MAGNETOMETER. THE THERMAL CONTROL IS PASSIVE. THE TELEMETRY SYSTEM IS A 1-W, S-BAND TRANSMITTER WITH TWO OPPOSITELY POLARIZED ANTENNAS. THE VECTOR MAGNETOMETER IS ALSO USED TO DETERMINE THE PITCH ANGLES OF THE PARTICLES MEASURED BY THE THREE INSTRUMENTS, WHICH ARE PROVIDED BY THE INVESTIGATORS. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX B.

----- CCE, GLOECKLER-----

INVESTIGATION NAME- CHARGE-ENERGY-MASS SPECTROMETER (CHEM)

NSSDC ID- CCE -03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - G. GLOECKLER U OF MARYLAND
OI - D.K. NOVOSTADT MPI-EXTRATERR PHYS
OI - G. PASCHMANN MPI-EXTRATERR PHYS
OI - B. WILKEN MPI-ASTRONOMY
OI - W.B. AXFORD MPI-ASTRONOMY

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF AN ENTRANCE COLLIMATOR AND AN ELECTROSTATIC ANALYZER SECTION, FOLLOWED BY A TIME-OF-FLIGHT AND TOTAL-ENERGY-MEASUREMENT SECTION. THE ENERGY RANGE COVERED IS FROM 2 TO 200 KEV/0, WITH A GEOMETRIC FACTOR OF 2.E-03 SQ CM-SR. ENERGY RESOLUTION IS 5 TO 10 PERCENT, AND ALL CHARGE STATES AND ISOTOPIES OF H AND HE, LI WITH ITS CHARGE STATES, AND MAJOR ELEMENTS AND CHARGE STATES UP TO AND INCLUDING FE ARE RESOLVED.

----- CCE, MCENTIRE-----

INVESTIGATION NAME- MEDIUM ENERGY PARTICLE ANALYZER (MEPA)

NSSDC ID- CCE -02

INVESTIGATIVE PROGRAM CODE 37

INVESTIGATION DISCIPLINE(S)
PARTICLED AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - R.W. MCENTIRE
OI - S.M. KRINIGIS

APPLIED PHYSICS LAB
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS INSTRUMENT HAS THE CAPABILITY OF RELIABLY MEASURING VERY SMALL FLUXES OF LITHIUM TRACER IONS OVER A WIDE ENERGY RANGE IN THE PRESENCE OF THE INT. BACKGROUND OF PROTONS, ALPHA PARTICLES AND ELECTRONS, WHILE MAINTAINING AS LARGE A GEOMETRY FACTOR AND AS LOW AN ENERGY THRESHOLD AS POSSIBLE. IN ADDITION, IT HAS THE CAPABILITY OF MONITORING THE NATURAL TRACER IONS (2 GREATER THAN OR EQUAL TO 2 NUCLEI) WITH CHARGE, ENERGY, PITCH-ANGLE AND TEMPORAL RESOLUTION. THE INSTRUMENT CONSISTS OF A THIN-FOIL, SOLID-STATE DETECTOR TELESCOPE WITH A VERY THIN FRONT ELEMENT AND A 10-CM SEPARATION BETWEEN THE FRONT AND REAR DETECTORS. PARTICLE TIME OF FLIGHT (TOF) IS MEASURED BETWEEN THE FRONT AND REAR DETECTORS, AND RESIDUAL PARTICLE ENERGY IS MEASURED IN THE REAR DETECTOR. TWO-PARAMETER ANALYSIS (TOF AND ENERGY) IS PERFORMED ON PARTICLES PENETRATING THE FRONT DETECTOR, PROVIDING PRECISE CHARGE RESOLUTION WITH UNPRECEDENTED IMMUNITY TO ACCIDENTAL EVENTS OVER AN ENERGY RANGE (FOR 2 FROM 1 TO 16) FROM APPROXIMATELY 0.06 TO 20 MEV/M.

----- CCE, SHELLEY -----

INVESTIGATION NAME- PLASMA COMPOSITION

NSSDC ID- CCE -01

INVESTIGATIVE PROGRAM CODE 37/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.G. SHELLEY
OI - R.D. SHARP
OI - G. MAERENDEL
OI - A.R. ROSENBAUM
OI - R.G. JOHNSON
OI - P.R. EBERHARDT
OI - M. BALSIGER
OI - J. GEISS
OI - D.T. YOUNG
OI - A. GHISETTI

LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
MPI-EXTRATERM PHYS
MPI-AERONOMY
LOCKHEED PALO ALTO
U OF BERNE
U OF BERNE
U OF BERNE
U OF BERNE

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ENTRANCE COLLIMATOR AND RETARDING POTENTIAL ANALYZER, A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER, AND A COMBINED ELECTROSTATIC-MAGNETIC MASS ANALYZER IN SERIES. THE ENERGY RANGE COVERED IS 0.05 TO 17 KEV/M, WITH A GEOMETRIC FACTOR RANGING FROM 1 TO 5 X 1.E-02 SR CM. AN ENERGY RESOLUTION FROM 5 TO 10 PERCENT, AND A MASS/RESOLUTION OF 10 PERCENT. THIS INSTRUMENT CLEARLY SEPARATES LI+ AND BA+ TRACER IONS FROM THE BACKGROUND. IT IS NEARLY IDENTICAL TO THE ONE FLOWN ON ISEE 1 BY THE SAME GROUP OF INVESTIGATORS, AND TO THE ONE DEVELOPED FOR THE DYNAMICS EXPLORER SPACECRAFT.

***** CODE *****

SPACECRAFT COMMON NAME- CODE

ALTERNATE NAMES- COSMIC BACKGROUND EXPL

NSSDC ID- CODE

LAUNCH DATE- 07/01/87

WEIGHT- 2260. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

UNITED STATES NASA-055

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 103. MIN
PERIAPSIS- 900. KM ALT

INCLINATION- 99. DEG
APOAPSIS- 900. KM ALT

PERSONNEL

MG - D. WRUBLIK
SC - R.W. BURGESS
PM - R.A. MATTHEW
PS - J.C. MATHER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-6SFC
NASA-6SFC

BRIEF DESCRIPTION

THE PURPOSE OF THE CODE MISSION IS TO TAKE PRECISE MEASUREMENTS OF THE DIFFUSE RADIATION BETWEEN 1 MICROMETER AND 13 MM OVER THE WHOLE CELESTIAL SPHERE. THE FOLLOWING QUANTITIES ARE MEASURED: (1) THE SPECTRUM OF THE 3 A RADIATION OVER THE RANGE 0.1 TO 10 MM, (2) THE ISOTROPY OF THIS RADIATION FROM 3.3 TO 13 MM, AND (3) THE SPECTRUM AND ANGULAR DISTRIBUTION OF DIFFUSE INFRARED BACKGROUND RADIATION AT WAVELENGTHS FROM 1 TO 300 MICROMETERS. THE SPACECRAFT CONSISTS OF A BASE MODULE TO WHICH AN EXPERIMENT MODULE IS ATTACHED.

THE EXPERIMENT MODULE CONTAINS A LIQUID NE DEWAR FILLED WITH 70 KG OF 1.6 DEG K SUPERFLUID, WITH A CONICAL SUN SHADE/SHROUD PLANE. THE TWO MODULES ROTATE AT ONE RPM ABOUT THE AXIS OF SYMMETRY. THE ORIENTATION OF THE 1-RPM SPIN AXIS IS MAINTAINED ANTI-EARTH AND AT 94 DEG TO THE SUN/EARTH LINE. THE SPACECRAFT IS A 12-SIDED POLYHEDRON THAT HAS SOLAR PANELS ON EACH SIDE TO SUPPLY AN ORBIT-AVERAGED POWER OF 400 W. THE COMMUNICATIONS AND DATA HANDLING SYSTEM PROVIDES FOR CONTROL OF ALL SPACECRAFT AND EXPERIMENT FUNCTIONS. A NASA STANDARD TORSION TRANSDUCER IS USED FOR COMMAND, TELEMETRY, AND TRACKING. TRANSMISSION OF DATA IS THROUGH A S-BAND PHASED-ARRAY ANTENNA EITHER IN REAL TIME OR FROM A TAPE RECORDER. THE SPACECRAFT ALSO HOUSES A PROPULSION SYSTEM THAT BOOSTS IT FROM ITS 300-KM ALTITUDE SHUTTLE PARKING ORBIT TO THE 900-KM OPERATIONAL ALTITUDE. THE OPERATIONAL ORBIT IS A DAWN-DUSK SUN-SYNCHRONOUS ONE, SO THAT THE SUN IS ALWAYS TO THE SIDE AND CAN BE SHIELDED FROM THE INSTRUMENTS. WITH THIS ORBIT AND THE SPIN AXIS ORIENTATION, THE INSTRUMENTS PERFORM A COMPLETE SCAN OF THE CELESTIAL SPHERE EVERY 6 MONTHS. THE SPIN AND SYMMETRICAL CONFIGURATION ELIMINATE LOCAL THERMAL EFFECTS THAT COULD BIAS THE DATA. LOW-CONDUCTANCE SUPPORTS AND MULTILAYERED INSULATION ARE USED TO DECOUPLE THE SPACECRAFT AND EXPERIMENT MODULES.

----- CODE, MAUSER -----

INVESTIGATION NAME- DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE)

NSSDC ID- CODE -02

INVESTIGATIVE PROGRAM CODE 3C

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - M.G. MAUSER
OI - J.C. MATHER
OI - D.T. WILKINSON
OI - S. GULKIS
OI - R. WEISS
OI - G.F. SMOOT

NASA-6SFC
NASA-6SFC
PRINCETON U
NASA-JPL
MASS INST OF TECH
LAWRENCE BERKELEY LAB

BRIEF DESCRIPTION

THE DIFFUSE IN BACKGROUND EXPERIMENT (DIRBE) CONSISTS OF A CRYOGENICALLY COOLED (TO 2 DEG K) POLYBAND RADIOMETER USED TO INVESTIGATE DIFFUSE INFRARED RADIATION FROM 1 TO 300 MICROMETERS. THE INSTRUMENT MEASURES THE ABSOLUTE FLUX IN 10 WAVELENGTH BANDS WITH A 1-DEG FIELD OF VIEW POINTED 30 DEG OFF THE SPIN AXIS. DETECTORS (PHOTOCONDUCTORS) AND FILTERS FOR THE 8-100 MICROMETER CHANNELS ARE THE SAME AS FOR THE IRAS MISSION. DOLOMETERS ARE USED FOR THE LONGEST WAVELENGTH CHANNEL (300-300 MICROMETERS). THE DIRBE SENSITIVITY WILL BE BETTER THAN 2.E-12 W/SM CM-SR PER M2 TO THE POWER 0.5 IN CHANNELS 1-3. CHANNELS 4-9 WILL REACH 6.E-13 WHILE CHANNEL 10 WITH ITS LESS SENSITIVE DOLOMETER BUT LARGER EXTENSIVE WILL REACH 4.E-12. THESE LIMITS ARE ACHIEVABLE WITH EXISTING DETECTORS COOLED TO NEAR THE CRYOSTAT TEMPERATURE OF 1.6 DEG K. THE TELESCOPE IS A WELL RAFFLED, OFF-AXIS GREGORIAN FLUX COLLECTOR WITH REIMAGING. THE INSTRUMENT WEIGHS APPROXIMATELY 30 KG, USES 15 W AND HAS A DATA RATE OF 2000 DPS.

----- CODE, MATHER -----

INVESTIGATION NAME- FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)

NSSDC ID- CODE -01

INVESTIGATIVE PROGRAM CODE 3C

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.C. MATHER
OI - R. WEISS
OI - M.G. MAUSER
OI - D.T. WILKINSON
OI - G.F. SMOOT
OI - S. GULKIS

NASA-6SFC
MASS INST OF TECH
NASA-6SFC
PRINCETON U
LAWRENCE BERKELEY LAB
NASA-JPL

BRIEF DESCRIPTION

THE FAR IR ABSOLUTE SPECTROPHOTOMETER (FIRAS) IS A CRYOGENICALLY COOLED POLARIZING NICHOLSON INTERFEROMETER USED AS A FOURIER TRANSFORM SPECTROMETER. THE INSTRUMENT POINTS ALONG THE SPIN AXIS AND HAS A 7-DEG FIELD OF VIEW. THIS DEVICE MEASURES THE SPECTRUM TO A PRECISION OF 1/1000 OF THE PEAK FLUX AT 1.7 MM FOR EACH 7-DEG FIELD OF VIEW ON THE SKY (OVER THE RANGE 0.1 TO 10 MM). THE FIRAS USES A SPECIAL FLARED TRUMPET HORN FLUX COLLECTOR HAVING VERY LOW SIDELobe LEVELS, AN EXTERNAL CALIBRATOR COVERING THE ENTIRE BEAM, AND REQUIRES PRECISE TEMPERATURE REGULATION AND CALIBRATION. THE INSTRUMENT HAS A DIFFERENTIAL INPUT TO COMPARE THE SKY WITH AN INTERNAL REFERENCE AT 3 DEG K. THIS FEATURE PROVIDES IMMUNITY FROM SYSTEMATIC ERRORS IN THE SPECTROMETER, AND CONTRIBUTES SIGNIFICANTLY TO THE ABILITY TO DETECT SMALL DEVIATIONS FROM A BLACKBODY SPECTRUM. THE INSTRUMENT WEIGHS 40 KG, USES 10 W, AND HAS A DATA RATE OF 1100 DPS.

----- CUBE, SMOOT-----
 INVESTIGATION NAME- DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)
 NSSDC ID- CODE -03 INVESTIGATIVE PROGRAM
 CODE SC
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - G.F. SMOOT LAWRENCE BERKELEY LAB
 O1 - S. GULKIS NASA-JPL
 O1 - D.T. WILKINSON PRINCETON U
 O1 - J.C. MATHUR NASA-GSFC
 O1 - M.G. HAUSER NASA-GSFC
 O1 - R. WEISS MASS INST OF TECH

BRIEF DESCRIPTION
 THE DIFFERENTIAL MICROWAVE RADIOMETER (DMR) INVESTIGATION USES FOUR DIFFERENTIAL RADIOMETERS TO MAP THE SKY AT 23.5, 31.4, 53, AND 98 GHZ. THE RADIOMETERS ARE DISTRIBUTED AROUND THE OUTER SURFACE OF THE CRYOSTAT. EACH RADIOMETER EMPLOYS A PAIR OF HORN ANTENNAS VIEWING AT 30 DEG FROM THE SPIN AXIS OF THE SPACECRAFT, MEASURING THE DIFFERENTIAL TEMPERATURE BETWEEN POINTS IN THE SKY SEPARATED BY 60 DEG. AT EACH FREQUENCY, THERE ARE TWO CHANNELS FOR DUAL POLARIZATION MEASUREMENTS, FOR IMPROVED SENSITIVITY, AND FOR RELIABILITY. EACH RADIOMETER IS A MICROWAVE RECEIVER, WHOSE INPUT IS SWITCHED RAPIDLY BETWEEN THE TWO HORN ANTENNAS, OBTAINING THE DIFFERENCE IN BRIGHTNESS OF TWO FIELDS OF VIEW 7 DEG IN DIAMETER LOCATED 60 DEG APART AND 30 DEG FROM THE AXIS OF THE SPACECRAFT. HIGH SENSITIVITY IS ACHIEVED BY TEMPERATURE STABILIZATION (AT 300 DEG K), BY SPACECRAFT SPIN, AND BY THE ABILITY TO INTEGRATE OVER THE ENTIRE YEAR. SENSITIVITY TO LARGE-SCALE ANISOTROPIES IS ABOUT 3E-5 DEG K. THE INSTRUMENT WEIGHS 58 KG, USES 114 W AND HAS A DATA RATE OF 500 BPS.

***** DMRP 50-1/F5*****

SPACECRAFT COMMON NAME- DMRP 50-1/F5
 ALTERNATE NAMES- DMRP BLOCK 50-1, DMRP001
 DMRP-F5

NSSDC ID- DMRP-F5

LAUNCH DATE- WEIGHT- 450. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC INCLINATION- 99. DFG
 ORBIT PERIOD- 101.8 MIN APOAPSIS- 880. KM ALT
 PERIAPSIS- 810. KM ALT

PERSONNEL
 PM - W.O. RYER USAF SPACE DIVISION

BRIEF DESCRIPTION
 DMRP 50-1/F5 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAMP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1975. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN 30-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING ORBIT OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT NOON. THE 5.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (INCLUDING THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29-SM-SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 0.59 KM (1/3 NAUTICAL MILE) RESOLUTION FOR MAJOR LAND MASSES, 2.7 KM (1-1/2 NAUTICAL MILE) RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR M (SSM), A STEP-SCANNING RADIOMETER, IS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND

LOCKING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMRP 50-1/F5, AFMC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)
 NSSDC ID- DMRP-F5-01 INVESTIGATIVE PROGRAM
 OPERATIONAL METEOROLOGICAL SYS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - AFMC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
 THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMRP-F5 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY-NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN "XY" MOTION, WITH OPTICAL COMPENSATION FOR IMAGE STABILIZATION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO "MODES": "VISUAL" AND "THERMAL". SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .50 KM AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVER A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMRP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMRP 50-1/F5, AFMC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
 SPECIAL SENSOR M (SSM)

NSSDC ID- DMRP-F5-02 INVESTIGATIVE PROGRAM
 OPERATIONAL METEOROLOGICAL SYS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - AFMC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
 SPECIAL SENSOR M (SSM) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECT OF THIS EXPERIMENT IS TO OBTAIN VERTICAL TEMPERATURE, HUMIDITY, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSM IS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (838 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 655 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 488.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL SYSTEM, DETECTION AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSM TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR IS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION IS APPROXIMATELY 39 KM AT NAHAR. THE RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR M, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMRP 50-1/F5, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER
 NSSDC ID- DMRP-F5-03 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 AERONOMY

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE SPECTROMETER CONSISTS OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE FIRST POINT TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATION ELECTRONS. THE LARGE ESA HAS A FIELD OF VIEW (FOV) OF 1.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAS A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERS THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

----- DMSF 50-1/F5, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- DMSF-F5-05 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDES MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.66/CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 DEG K. THE PEA MEASURES ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA IS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY VECTOR, WHILE THE SEA IS ORIENTED AT RIGHT ANGLES TO THIS DIRECTION AND AWAY FROM THE SUN TO MINIMIZE THE EFFECT OF PHOTOELECTRONS. THE DEVICE ALSO PROVIDES A MEASUREMENT OF THE SPACECRAFT POTENTIAL.

----- DMSF 50-1/F5, SHYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- DMSF-F5-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
IONOSPHERICS

PERSONNEL
PI - A.L. SHYDER USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPS FROM 1.3 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE IS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MAN-MADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (F0F2). THE F0F2 PARAMETER IS USED IN CONSTRUCTING ELECTRON DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT CAN DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

***** DMSF 50-2/F10*****

SPACECRAFT COMMON NAME- DMSF 50-2/F10
ALTERNATE NAMES- DMSF BLOCK 50-2, DMSF-F10
DMSF 50-2/S10

NSSDC ID- DMSF10

LAUNCH DATE- WEIGHT- 468. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS E

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.89 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 564. KM ALT APOAPSIS- 653. KM ALT

PERSONNEL
PM - R. RIVERS USAF SPACE DIVISION

BRIEF DESCRIPTION
DMSF-F10 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSF). THIS PROGRAM, PREVIOUSLY KNOWN AS NAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS,

(3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 0.29 SQ M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AND 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE CONTAINS FIVE SPECIAL SENSORS: (1) SPECIAL SENSOR 4-T (SSM-1), MICROWAVE TEMPERATURE SOUNDER, (2) SPECIAL SENSOR D/H (SSD/H), X-RAY SPECTROMETER, (3) SPECIAL SENSOR 1/ES (SS1/ES), IONOSPHERIC/SCINTILLATION MONITOR, (4) SPECIAL SENSOR J/4 (SSJ/4), PRECIPITATION ELECTRON/ION SPECTROMETER, AND (5) SPECIAL SENSOR M/I (SSM-1), MICROWAVE IMAGER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES FOUR HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCON TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSF 50-2/F10, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINE-SCAN SYSTEM (OLS)

NSSDC ID- DMSF10-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE OPERATIONAL LINE-SCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSF BLOCK 50 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (10.2 TO 12.8 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA, WITH A RESOLUTION OF 2.8 KM. THERE ARE THREE ONBOARD RECORDERS, AND EACH HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 190 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSF BLOCK 50,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSF 50-2/F10, AFGWC STAFF-----

INVESTIGATION NAME- SSM/T-MICROWAVE TEMPERATURE SOUNDER

NSSDC ID- DMSF10-02 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
AERONOMY
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE SPECIAL SENSOR MICROWAVE/TEMPERATURE SOUNDER IS A SEVEN-CHANNEL SCANNING RADIOMETER WHICH WILL MEASURE RADIATION IN THE 5- TO 6-MM WAVELENGTH (50-60 GHZ) REGION SPECIFICALLY 50.5, 53.2, 54.35, 54.9, 58.4, 58.825, AND 59.4 GHZ TO PROVIDE DATA FOR VERTICAL TEMPERATURES FROM THE EARTH'S SURFACE TO ABOVE 30 KM. IT WILL PROVIDE TEMPERATURE SOUNDINGS OVER PREVIOUSLY INACCESSIBLE CLOUDY REGIONS AND AT HIGHER ALTITUDES THAN ARE ATTAINABLE FROM THE SSM. THE SSM/T OPERATES IN THE ABSORPTION BAND OF MOLECULAR OXYGEN. BY CHOOSING FREQUENCIES

WITH DIFFERENT ABSORPTION COEFFICIENTS ON THE WING OF THE OXYGEN ABSORPTION BAND, A SERIES OF WEIGHING FUNCTIONS PEAKING AT PRESELECTED ALTITUDES IS OBTAINED. THE RADIOMETER SCANS ACROSS THE NADIR TRACK ON SEVEN SCAN POSITIONS AND TWO CALIBRATION POSITIONS (COLD SKY AND 300 DEG K). THE DWELL TIME FOR THE CROSSTRACK AND CALIBRATION POSITIONS IS 2.7 S EACH. THE TOTAL SCAN PERIOD IS 32 S. THE INSTRUMENT HAS AN INSTANTANEOUS FIELD OF VIEW OF 12 DEG AND SCANS PLUS OF MINUS 36 DEG FROM NADIR.

----- DMSF 50-2/F10, AFGWC STAFF-----

INVESTIGATION NAME- MICROWAVE IMAGER

NSSDC ID- DMSF10-05 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
OCEANOGRAPHY
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE PURPOSE OF THE MICROWAVE IMAGER IS TO PROVIDE DAY AND NIGHT MEASUREMENTS OF OCEAN SURFACE WIND SPEED, ICE COVERAGE AND AGE, AREA AND INTENSITY OF PRECIPITATION, CLOUD WATER CONTENT AND LAND SURFACE MOISTURE. AN ESTIMATE OF ATMOSPHERIC ATTENUATION AT EACH OF THE SSM/I SENSOR FREQUENCIES WILL BE AVAILABLE ALSO. MICROWAVE BRIGHTNESS TEMPERATURES ARE OBTAINED WITH A 7-CHANNEL PASSIVE MICROWAVE RADIOMETER OPERATING AT FOUR FREQUENCIES, THREE WITH BOTH VERTICAL AND HORIZONTAL POLARIZATION (19.35, 37.0, 85.5, GHz) AND ONE WITH VERTICAL POLARIZATION (22.23 GHz). THE INSTRUMENT WILL SCAN A CROSS TRACK TO GATHER DATA OVER AN APPROXIMATE 1400 KM SWATH WIDTH WITH HORIZONTAL RESOLUTIONS 15 TO 50 KM FOR DIFFERENT FREQUENCIES. THE DATA CAN BE USED FOR TROPICAL STORM RECONNAISSANCE, SHIP ROUTING IN POLAR REGIONS, AGRICULTURAL WEATHER, AIRCRAFT ROUTING AND REFUELING, ETC.

----- DMSF 50-2/F10, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON/ION SPECTROMETER

NSSDC ID- DMSF10-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE PRECIPITATION ELECTRON/ION SPECTROMETER IS TO MEASURE FLUX AND ENERGIES OF ELECTRONS AND IONS PRECIPITATING INTO THE UPPER ATMOSPHERE. PARTICLES ARE SEPARATED BY AN ELECTROSTATIC ANALYZER INTO 20 ENERGY BANDS FROM 30 EV TO 30 KEV. CHANNELTRONS ARE USED TO COUNT THE IMPINGING ELECTRONS AND IONS IN EACH ENERGY BAND. THE INSTRUMENT DETECTS PARTICLES AT (1) 10 HIGH-ENERGY LEVELS: 0.948, 1.39, 2.04, 3.00, 4.40, 6.46, 9.48, 13.92, 20.44 AND 30.00 KEV; AND (2) 10 LOW-ENERGY LEVELS: 3.00, 44.0, 64.6, 94.9, 139.2, 204.4, 300, 440, 646, AND 948 EV.

----- DMSF 50-2/F10, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC/SCINTILLATION MONITOR

NSSDC ID- DMSF10-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE IONOSPHERIC/SCINTILLATION MONITOR IS TO MEASURE ELECTRON DENSITY AND TEMPERATURE, HYDROGEN AND OXYGEN ION DENSITY AND TEMPERATURE, POWER SPECTRUM OF PLASMA IRREGULARITIES, AND THE VELOCITY COMPONENTS OF BULK PLASMA FLOW AT SATELLITE ALTITUDE. THE EXPERIMENT CONSISTS OF FOUR SENSORS. THE ELECTROSTATIC ANALYZER MEASURES ELECTRON PARAMETERS AT LEAST 1 METER ABOVE SATELLITE SURFACE. THE ION RETARDING POTENTIAL ANALYZER HAS A BODY-MOUNTED ELECTROSTATIC TRAP WITH A CIRCULAR APERTURE TO MEASURE ION DENSITY AND TEMPERATURE. THE DRIFTMETER USES A PLANAR ELECTROSTATIC ION TRAP WITH A FOUR-QUADRANT COLLECTOR. THE CURRENT IS MEASURED IN PAIRS OF QUADRANTS AND DIFFERENCED TO PROVIDE PLASMA DRIFT VELOCITIES. THE SCINTILLATION MONITOR OBTAINS POWER SPECTRUM IRREGULARITIES BY AN ION TRAP WITH ELECTROMETER AND AMPLIFIERS CAPABLE OF MEASURING DC AND AC CURRENT FROM 20 HZ TO 12 KHZ.

***** DMSF 50-2/F6*****

SPACECRAFT COMMON NAME- DMSF 50-2/F6
ALTERNATE NAMES- DMSF BLOCK 50-2, DMSF-F6
DMSF 50-2/56

NSSDC ID- DMSF-F6

LAUNCH DATE- WEIGHT- 468. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS E

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAf

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.4 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 817. KM ALT APOAPSIS- 839. KM ALT

PERSONNEL
PI - J. RIVERS USAF SPACE DIVISION

BRIEF DESCRIPTION

DMSF-F6 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSF). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 6.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 SQ M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED "EARTH-LOOKING" MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AND 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE CONTAINS FOUR SPECIAL SENSORS: (1) SPECIAL SENSOR M-2 (SSM-2), HUMIDITY-TEMPERATURE SOUNDER, (2) SPECIAL SENSOR B/A (SSB/A), SCANNING X-RAY SPECTROMETER, (3) SPECIAL SENSOR I/E (SSI/E), IONOSPHERIC PLASMA MONITOR, AND (4) SPECIAL SENSOR J/4 (SSJ/4), PRECIPITATION ELECTRON/ION SPECTROMETER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES FOUR HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, "THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM," D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSF 50-2/F6, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSF-F6-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSF BLOCK 50 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ("LIGHT" AND "THERMAL") SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (10.2 TO 12.8 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS

(LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA, WITH A RESOLUTION OF 2.8 KM. THERE ARE THREE ONBOARD RECORDERS, AND EACH HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 190 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP BLOCK 5D,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSP 5D-2/F6, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR M-2 (SSH-2)

NSSDC ID- DMSP-F6-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR M-2 (SSH-2) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN VERTICAL TEMPERATURE, AND WATER VAPOR PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH-2 IS A 16-CHANNEL SENSOR WITH ONE CHANNEL (800 CM-1) IN THE ATMOSPHERIC WINDOW CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 788, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 488.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 38-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH-2 TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR IS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION IS APPROXIMATELY 39 KM AT NADIR. THE RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE AND WATER VAPOR PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR M, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP 5D-2/F6, AFGWC STAFF-----

INVESTIGATION NAME- SCANNING X-RAY SPECTROMETER

NSSDC ID- DMSP-F6-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - AFGWC STAFF USAF TECH APPL CTR

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVE OF THE SCANNING X-RAY SPECTROMETER IS TO CARRY OUT STUDIES IN X-RAYS, LYMAN ALPHA, LOCALLY MIRROR ELECTRONS, CLASSIFIED APPLICATION, AND ELECTRON SPECTRA AND FLUXES DEDUCED FROM REMOTELY SENSED BREMSSTRAHLUNG RADIATION. THE INSTRUMENT HAS THREE PARTS: (1) PROPORTIONAL COUNTERS TO MEASURE X RAYS BETWEEN 2 AND 30 KEV, (2) COTE CRYSTALS TO MEASURE X RAYS BETWEEN 15 AND 100 KEV, AND (3) TWO GEIGER COUNTERS TO MEASURE ELECTRON FLUXES ABOVE 40 KEV AND 100 KEV.

----- DMSP 5D-2/F6, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON/ION SPECTROMETER

NSSDC ID- DMSP-F6-05 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE PRIMARY PURPOSE OF THE PRECIPITATION ELECTRON/ION SPECTROMETER IS TO MEASURE FLUX AND ENERGIES OF ELECTRONS AND IONS PRECIPITATING INTO THE UPPER ATMOSPHERE. PARTICLES ARE SEPARATED BY AN ELECTROSTATIC ANALYZER INTO 23 ENERGY BANDS FROM 30 EV TO 30 KEV. CHANNELTRONS ARE USED TO COUNT THE IMPINGING ELECTRONS AND IONS IN EACH ENERGY BAND. THE INSTRUMENT DETECTS PARTICLES AT (1) 10 HIGH-ENERGY LEVELS: 0.940, 1.39, 2.84, 3.89, 4.48, 6.46, 9.48, 13.92, 20.44 AND 30.88 KEV; AND (2) 10 LOW-ENERGY LEVELS: 3.89, 4.48, 6.46,

94.9, 139.2, 284.4, 389, 448, 646, AND 948 EV.

----- DMSP 5D-2/F6, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- DMSP-F6-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO MEASURE ELECTRON DENSITY AND TEMPERATURE, HYDROGEN AND OXYGEN ION DENSITY AND TEMPERATURE, AND THE VELOCITY COMPONENTS OF BULK PLASMA FLOW AT SATELLITE ALTITUDE. THE INSTRUMENT CONSISTS OF (1) AN ELECTRON ANALYZER, (2) AN ION RETARDING POTENTIAL ANALYZER, AND (3) A CRYPTOMETER. THE ELECTRON ANALYZER PROVIDES ELECTRON PARAMETERS AT LEAST 1 METER ABOVE SATELLITE SURFACE. ION DENSITY AND TEMPERATURE WILL BE MEASURED BY A BODY-MOUNTED ELECTROSTATIC ION TRAP WITH A CIRCULAR APERTURE IN THE ION RETARDING ANALYZER. THE DRIFTMETER CAN MEASURE PLASMA DRIFT BY A BODY-MOUNTED PLANAR ELECTROSTATIC ION TRAP. THE COLLECTOR IS SPLIT INTO FOUR EQUAL QUADRANTS. THE CURRENT IS MEASURED IN PAIRS OF QUADRANTS AND DIFFERENCED TO MEASURE DRIFT VELOCITIES.

***** DMSP 5D-2/F7*****

SPACECRAFT COMMON NAME- DMSP 5D-2/F7
ALTERNATE NAMES- DMSP BLOCK 5D-2, DMSP-F7
DMSP 5D-2/S7

NSSDC ID- DMSP-F7

LAUNCH DATE- WEIGHT- 468. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS E

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.4 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 817. KM ALT APOAPSIS- 839. KM ALT

PERSONNEL
PR - J. RIVERS USAF SPACE DIVISION

BRIEF DESCRIPTION

DMSP-F7 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1975. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 6.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 4.29 SQ M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.81 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED SPHERERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE CONTAINS SEVEN SPECIAL SENSORS: (1) SPECIAL SENSOR M-2 (SSH-2) VERTICAL TEMPERATURE PROFILE RADIOMETER, (2) SPECIAL SENSOR M/1 (SSM/1), MICROWAVE TEMPERATURE SOUNDER, (3) SPECIAL SENSOR B/5 (SSB/5) X-RAY SPECTROMETER, (4) SPECIAL I/E (SSI/E), IONOSPHERIC PLASMA MONITOR (5) SPECIAL SENSOR J/4 (SSJ/4), PRECIPITATION ELECTRON/ION SPECTROMETER, (6) SPECIAL SENSOR M (SSM), MAGNETOMETER, AND (7) SPECIAL SENSOR J* (SSJ*), SPACE RADIATION DOSIMETER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES FOUR HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE THICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LONG AFB, ME, AND RELAYED BY SATCON TO

AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D.A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP 5D-2/F7, AFMGC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSP-F7-01

INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

AFMGC STAFF

GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSP BLOCK 5D SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ("LIGHT" AND "THERMAL") SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (11.2 TO 12.8 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA, WITH A RESOLUTION OF 2.8 KM. THERE ARE THREE ONBOARD RECORDERS, AND EACH HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 100 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP BLOCK 5D,' D.A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSP 5D-2/F7, AFMGC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR M-2 (SSM-2)

NSSDC ID- DMSP-F7-02

INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

AFMGC STAFF

GLOBAL WEATHER CTR

BRIEF DESCRIPTION

SPECIAL SENSOR M-2 (SSM-2) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN VERTICAL TEMPERATURE, AND WATER VAPOR PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSM-2 IS A 16-CHANNEL SENSOR WITH ONE CHANNEL (800 CM-1) IN THE ATMOSPHERIC WINDOW CHANNEL (855 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 691, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 488.5, 441.5, 428, 374, 397.5, 355, 333.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSM-2 TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION IS APPROXIMATELY 30 KM AT NADIR. THE RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE AND WATER VAPOR PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR M,' D.A. NICHOLS, OPTICAL SUBSYSTEMS, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP 5D-2/F7, AFMGC STAFF-----

INVESTIGATION NAME- SSM/T-MICROWAVE TEMPERATURE SOUNDER

NSSDC ID- DMSP-F7-03

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
AERONOMY
METEOROLOGY

PERSONNEL

PI -

AFMGC STAFF

GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE SPECIAL SENSOR MICROWAVE/TEMPERATURE SOUNDER IS A SEVEN-CHANNEL SCANNING RADIOMETER WHICH WILL MEASURE RADIATION IN THE 9- TO 6-MM WAVELENGTH (50-60 GHI) REGION SPECIFICALLY 58.5, 53.2, 54.35, 54.9, 58.4, 58.825, AND 59.4 GHI TO PROVIDE DATA FOR VERTICAL TEMPERATURES FROM THE EARTH'S SURFACE TO ABOVE 30 KM. IT WILL PROVIDE TEMPERATURE SOUNDINGS OVER PREVIOUSLY INACCESSIBLE CLOUDY REGIONS AND AT HIGHER ALTITUDES THAN ARE ATTAINABLE FROM THE SSM. THE SSM/T OPERATES IN THE ABSORPTION BAND OF MOLECULAR OXYGEN. BY CHOOSING FREQUENCIES WITH DIFFERENT ABSORPTION COEFFICIENTS ON THE WING OF THE OXYGEN ABSORPTION BAND, A SERIES OF WEIGHING FUNCTIONS PEAKING AT PRESELECTED ALTITUDES IS OBTAINED. THE RADIOMETER SCANS ACROSS THE NADIR TRACK ON SEVEN SCAN POSITIONS AND TWO CALIBRATION POSITIONS (COLD SKY AND 300 DEG K). THE SCANNING TIME FOR THE CROSSTRACK AND CALIBRATION POSITIONS IS 2.7 S EACH. THE TOTAL SCAN PERIOD IS 32 S. THE INSTRUMENT HAS AN INSTANTANEOUS FIELD OF VIEW OF 12 DEG AND SCANS PLUS OF MINUS 36 DEG FROM NADIR.

----- DMSP 5D-2/F7, AFMGC STAFF-----

INVESTIGATION NAME- MAGNETOMETER

NSSDC ID- DMSP-F7-06

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI -

AFMGC STAFF

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE MAGNETOMETER EXPERIMENT IS TO OBTAIN THE COMPONENT OF MAGNETIC FIELD TRANSVERSE TO THE MAIN GEOMAGNETIC FIELD AT HIGH LATITUDES WHICH ARE ASSOCIATED WITH AURORAL FIELD-ALIGNED CURRENTS. THE INSTRUMENT CONSISTS OF A TRIAXIAL FLUXGATE MAGNETOMETER, WITH FIXED Z-AXIS MAGNETOMETER AND ADJUSTABLE X-, Y-AXIS MAGNETOMETER, AND A SIGNAL PROCESSOR TO PROVIDE DATA AT 10-GAUSS RESOLUTION.

----- DMSP 5D-2/F7, AFMGC STAFF-----

INVESTIGATION NAME- SPACE RADIATION DOSIMETER

NSSDC ID- DMSP-F7-07

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI -

AFMGC STAFF

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE SPACE RADIATION DOSIMETER IS TO MEASURE THE RADIATION DOSE ABOVE DESIRED THRESHOLDS IN SILICON UNDER ALUMINUM SHIELDING OF FOUR THICKNESSES REPRESENTATIVE OF THE BLOCK 5D DMSP SPACECRAFT. THE INSTRUMENT CONSISTS OF FOUR DETECTORS MOUNTED BENEATH HEMISPHERICAL DOMES OF DIFFERENT THICKNESSES. EACH DETECTOR IS A PIN DIFFUSED JUNCTION SILICON DIODE. THE DOSIMETER DIRECTLY MEASURES THE IONIZATION IN THE SILICON TUBE CAUSED BY NATURAL RADIATION AND SERVES AS AN ELECTRON-PHOTON SPECTROMETER, THUS YIELDING THE FLUENCES OF ENERGETIC ELECTRONS AND PROTONS ENCOUNTERED IN THE ORBIT AS A FUNCTION OF TIME. THE ENERGY THRESHOLDS FOR MEASURED ELECTRONS BY DIFFERENT DOSE SENSORS ARE 1.0, 2.5, 5.0 AND 10.0 MEV AND THOSE FOR PROTONS ARE 20, 35, 51, AND 75 MEV. THE RADIATION DOSE AND THE ENERGETIC ELECTRON FLUX OBTAINED IN THIS EXPERIMENT MAY RESULT IN AN OPTIMIZATION OF SPACE RADIATION-SHIELDING DESIGN TO PROTECT SENSITIVE ELECTRONICS COMPONENTS.

----- DMSP 5D-2/F7, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON/ION SPECTROMETER

NSSDC ID- DMSP-F7-05

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - P.L. ROTHWELL

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE PRECIPITATION ELECTRON/ION SPECTROMETER IS TO MEASURE FLUX AND ENERGIES OF ELECTRONS AND IONS PRECIPITATED INTO THE UPPER ATMOSPHERE. PARTICLES ARE SEPARATED BY AN ELECTROSTATIC ANALYZER INTO 20 ENERGY BANDS FROM 30 EV TO 30 KEV. CHANNELTRONS ARE USED TO COUNT THE IMPINGING ELECTRONS AND IONS IN EACH ENERGY BAND. THE INSTRUMENT DETECTS PARTICLES AT (1) 10 HIGH-ENERGY LEVELS: 0.948, 1.39, 2.04, 3.08, 4.48, 6.46, 9.48, 13.92, 20.44 AND 30.08 KEV; AND (2) 10 LOW-ENERGY LEVELS: 3.08, 4.48, 6.46, 9.48, 13.92, 20.44, 30, 44.8, 64.6, AND 94.8 EV.

----- DMSP 5D-2/77, SABALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSDDC ID- DMSP-F7-04

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
AERONOMY
PARTICLES AND FIELDS

PERSONNEL

PI - R.C. SABALYN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO MEASURE ELECTRON DENSITY AND TEMPERATURE, HYDROGEN AND OXYGEN ION DENSITY AND TEMPERATURE, AND THE VELOCITY COMPONENTS OF BULK PLASMA FLOW AT SATELLITE ALTITUDE. THE INSTRUMENT CONSISTS OF (1) AN ELECTRON ANALYZER, (2) AN ION RETARDING POTENTIAL ANALYZER, AND (3) A DRIFTMETER. THE ELECTRON ANALYZER PROVIDES ELECTRON PARAMETERS AT LEAST 1 METER ABOVE SATELLITE SURFACE. ION DENSITY AND TEMPERATURE WILL BE MEASURED BY A BODY-MOUNTED ELECTROSTATIC ION TRAP WITH A CIRCULAR APERTURE IN THE ION RETARDING ANALYZER. THE DRIFTMETER CAN MEASURE PLASMA DRIFT BY A BODY-MOUNTED PLANAR ELECTROSTATIC ION TRAP. THE COLLECTOR IS SPLIT INTO FOUR EQUAL QUADRANTS. THE CURRENT IS MEASURED IN PAIRS OF QUADRANTS AND DIFFERENCED TO MEASURE DRIFT VELOCITIES.

***** DMSP 5D-2/78*****

SPACECRAFT COMMON NAME- DMSP 5D-2/78

ALTERNATE NAMES- DMSP BLOCK 5D-2, DMSP 5D-2/56
DMSP-F7

NSDDC ID- DMSP-F8

LAUNCH DATE-

WEIGHT- 462. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- ATLAS E

SPONSORING COUNTRY/AGENCY

UNITED STATES

DOD-USAF

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 101.4 MIN

PERIAPSIS- 817. KM ALT

INCLINATION- 98.7 DEG

APOAPOPSIS- 839. KM ALT

PERSONNEL

PM - J. RIVERS

USAF SPACE DIVISION

BRIEF DESCRIPTION

DMSP-F8 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 6.4-M LONG SPACECRAFT IS SEPERATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT SYSTEM (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 50 W SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION OF GYROSCOPES AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED "EARTH-LOOKING" MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY, 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE CONTAINS THREE SPECIAL SENSORS: (1) SPECIAL SENSOR 0/5 (SS0/5), X-RAY SPECTROMETER, (2) SPECIAL SENSOR 1/5 (SS1/5), IONOSPHERIC/SCINTILLATION MONITOR, AND (3) SPECIAL SENSOR 2/4 (SS2/4), PRECIPITATION ELECTRON/ION SPECTROMETER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES FOUR HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MCILLIC TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, "THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM," D. A. NICHOLS, OPTICAL ENGINEERING, 10, 4, JULY - AUGUST 1975.

----- DMSP 5D-2/78, AFMUC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSDDC ID- DMSP-F8-01

INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

AFMUC STAFF

GLOBAL WEATHER CIN

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSP BLOCK 5D SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ("LIGHT" AND "THERMAL") SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (10.2 TO 12.0 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA, WITH A RESOLUTION OF 2.0 KM. THERE ARE THREE ONBOARD RECORDERS, AND EACH HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 190 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, "PRIMARY OPTICAL SUBSYSTEMS FOR DMSP BLOCK 5D," D. A. NICHOLS, OPTICAL ENGINEERING, 10, NO. 4, JULY-AUGUST 1975.

----- DMSP 5D-2/78, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON/ION SPECTROMETER

NSDDC ID- DMSP-F8-03

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - P.L. ROTHWELL

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE PRECIPITATION ELECTRON/ION SPECTROMETER IS TO MEASURE FLUX AND ENERGIES OF ELECTRONS AND IONS PRECIPITATED INTO THE UPPER ATMOSPHERE. PARTICLES ARE SEPARATED BY AN ELECTROSTATIC ANALYZER INTO 20 ENERGY BANDS FROM 30 EV TO 10 KEV. CHANNELTRONS ARE USED TO COUNT THE IMPINGING ELECTRONS AND IONS IN EACH ENERGY BAND. THE INSTRUMENT DETECTS PARTICLES AT (1) 10 HIGH-ENERGY LEVELS: 0.948, 1.39, 2.04, 3.90, 4.40, 6.46, 9.45, 13.92, 20.44 AND 30.00 KEV, AND (2) 10 LOW-ENERGY LEVELS: 3.00, 4.0, 6.0, 9.4, 13.9, 20.4, 30.0, 40.0, 60.0, AND 94.8 EV.

----- DMSP 5D-2/78, SABALYN-----

INVESTIGATION NAME- IONOSPHERIC/SCINTILLATION MONITOR

NSDDC ID- DMSP-F8-02

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - R.C. SABALYN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE IONOSPHERIC/SCINTILLATION MONITOR IS TO MEASURE ELECTRON DENSITY AND TEMPERATURE, HYDROGEN AND OXYGEN ION DENSITY AND TEMPERATURE, POWER SPECTRUM OF PLASMA IRREGULARITIES, AND THE VELOCITY COMPONENTS OF BULK PLASMA FLOW AT SATELLITE ALTITUDE. THE EXPERIMENT CONSISTS OF FOUR SENSORS. THE ELECTROSTATIC ANALYZER MEASURES ELECTRON PARAMETERS AT LEAST 1 METER ABOVE SATELLITE SURFACE. THE ION RETARDING POTENTIAL ANALYZER HAS A BODY-MOUNTED ELECTROSTATIC TRAP WITH A CIRCULAR APERTURE TO MEASURE ION DENSITY AND TEMPERATURE. THE DRIFTMETER USES A PLANAR ELECTROSTATIC ION TRAP WITH A FOUR-QUADRANT COLLECTOR. THE CURRENT IS MEASURED IN PAIRS OF QUADRANTS AND DIFFERENCED TO PROVIDE PLASMA DRIFT VELOCITIES. THE SCINTILLATION MONITOR OBTAINS POWER SPECTRUM IRREGULARITIES BY AN ION TRAP WITH ELECTROMETER AND AMPLIFIERS CAPABLE OF MEASURING DC AND AC CURRENT FROM 20 HZ TO 12 KHZ.

***** DMSF 50-2/19*****

SPACECRAFT COMMON NAME- DMSF 50-2/19
ALTERNATE NAMES- DMSF BLOCK 50-2, DMSF-19
DMSF 50-2/19

NSSDC ID- DMSF-19

LAUNCH DATE- WEIGHT- 468. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS E

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.89 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 564. KM ALT APOAPSIS- 653. KM ALT

PERSONNEL
PM - J. RIVERS USAF SPACE DIVISION

BRIEF DESCRIPTION
DMSF-19 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSF). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 6.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AND 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE CONTAINS FIVE SPECIAL SENSORS: (1) SPECIAL SENSOR M-1 (SSM-1), MICROWAVE TEMPERATURE SOUNDER, (2) SPECIAL SENSOR B/X (SSB/X), X-RAY SPECTROMETER, (3) SPECIAL SENSOR I/E (SSI/E), IONOSPHERIC/SCINTILLATION MONITOR, (4) SPECIAL SENSOR J/Y (SSJ/Y), PRECIPITATION ELECTRON/ION SPECTROMETER, AND (5) SPECIAL SENSOR M/I (SSM-I), MICROWAVE IMAGER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES FOUR HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA. EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LONG AFB, ME, AND RELAYED BY SATCON TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSF 50-2/19, AFMWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSF-19-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFMWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSF BLOCK 50 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIO-METER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (10.2 TO 12.2 MICROMETERS). THE RADIO-METER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR

MODES: LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .06 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA, WITH A RESOLUTION OF 2.8 KM. THERE ARE THREE ONBOARD RECORDERS, AND EACH HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 190 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSF BLOCK 50,' D.A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSF 50-2/19, AFMWC STAFF-----

INVESTIGATION NAME- SSM/I-MICROWAVE TEMPERATURE SOUNDER

NSSDC ID- DMSF-19-02 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
AERONOMY
METEOROLOGY

PERSONNEL
PI - AFMWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE SPECIAL SENSOR MICROWAVE/TEMPERATURE SOUNDER IS A SEVEN-CHANNEL SCANNING RADIO-METER WHICH WILL MEASURE RADIATION IN THE 9- TO 6-MM WAVELENGTH (50-60 GHZ) REGION SPECIFICALLY 50.5, 53.2, 54.35, 54.9, 58.4, 58.825, AND 59.4 GHZ TO PROVIDE DATA FOR VERTICAL TEMPERATURES FROM THE EARTH'S SURFACE TO ABOVE 30 KM. IT WILL PROVIDE TEMPERATURE SOUNDINGS OVER PREVIOUSLY INACCESSIBLE CLOUDY REGIONS AND AT HIGHER ALTITUDES THAN ARE ATTAINABLE FROM THE SSM. THE SSM/I OPERATES IN THE ABSORPTION BAND OF MOLECULAR OXYGEN. BY CHOOSING FREQUENCIES WITH DIFFERENT ABSORPTION COEFFICIENTS ON THE WING OF THE OXYGEN ABSORPTION BAND, A SERIES OF WEIGHING FUNCTIONS PEAKING AT PRESELECTED ALTITUDES IS OBTAINED. THE RADIO-METER SCANS ACROSS THE NADIR TRACK ON SEVEN SCAN POSITIONS AND TWO CALIBRATION POSITIONS (COLD SKY AND 300 DEG K). THE DWELL TIME FOR THE CROSSTRACK AND CALIBRATION POSITIONS IS 2.7 S EACH. THE TOTAL SCAN PERIOD IS 32 S. THE INSTRUMENT HAS AN INSTANTANEOUS FIELD OF VIEW 12 DEG AND SCANS PLUS OR MINUS 36 DEG FROM NADIR.

----- DMSF 50-2/19, AFMWC STAFF-----

INVESTIGATION NAME- MICROWAVE IMAGER

NSSDC ID- DMSF-19-05 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - AFMWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE PURPOSE OF THE MICROWAVE IMAGER IS TO PROVIDE DAY AND NIGHT MEASUREMENTS OF OCEAN SURFACE WIND SPEED, ICE COVERAGE AND AGE, AREA AND INTENSITY OF PRECIPITATION, CLOUD WATER CONTENT AND LAND SURFACE MOISTURE AN ESTIMATE OF ATMOSPHERIC ATTENUATION AT EACH OF THE SSM/I SENSOR FREQUENCIES WILL BE AVAILABLE ALSO. MICROWAVE BRIGHTNESS TEMPERATURES ARE OBTAINED WITH A 7-CHANNEL PASSIVE MICROWAVE RADIO-METER OPERATING AT FOUR FREQUENCIES, THREE WITH BOTH VERTICAL AND HORIZONTAL POLARIZATION (19.35, 37.0, 89.5 GHZ) AND ONE WITH VERTICAL POLARIZATION (22.23 GHZ). THE INSTRUMENT WILL SCAN A CROSS TRACK TO GATHER DATA OVER AN APPROXIMATE 1000 KM SWATH WIDTH WITH HORIZONTAL RESOLUTIONS IS TO 50 KM FOR DIFFERENT FREQUENCIES. THE DATA CAN BE USED FOR TROPICAL STORM RECONNAISSANCE, SHIP ROUTING IN POLAR REGIONS, AGRICULTURAL WEATHER, AIRCRAFT ROUTING AND REFUELING, ETC.

----- DMSF 50-2/19, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON/ION SPECTROMETER

NSSDC ID- DMSF-19-06 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL USAF 6FOPHYS LAB

BRIEF DESCRIPTION
THE PRIMARY PURPOSE OF THE PRECIPITATING ELECTRON/ION SPECTROMETER IS TO MEASURE FLUX AND ENERGIES OF ELECTRONS AND IONS PRECIPITATED INTO THE UPPER ATMOSPHERE. PARTICLES ARE SEPARATED BY AN ELECTROSTATIC ANALYZER INTO 20 ENERGY BANDS FROM 30 EV TO 30 KEV. CHANNELS ARE USED TO COUNT THE IMPINGING ELECTRONS AND IONS IN EACH ENERGY BAND. THE INSTRUMENT DETECTS PARTICLES AT (1) 10 HIGH-ENERGY LEVELS: 0.948, 1.39, 2.04, 3.00, 4.48, 6.46, 9.40, 13.92, 20.44 AND

30.00 KEV) AND (2) 10 LOW-ENERGY LEVELS: 3.00, 4.00, 64.0, 96.0, 129.2, 204.0, 300.000, 640, AND 948 EV.

----- DMSF 30-2/79, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC/SCINTILLATION MONITOR

NSDC ID- DMSF-79-03

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - R.C. SAGALYN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE IONOSPHERIC/SCINTILLATION MONITOR IS TO MEASURE ELECTRON DENSITY AND TEMPERATURE, HYDROGEN AND OXYGEN ION DENSITY AND TEMPERATURE, POWER SPECTRUM OF PLASMA IRREGULARITIES, AND THE VELOCITY COMPONENTS OF OULR PLASMA FLOW AT SATELLITE ALTITUDES. THE EXPERIMENT CONSISTS OF FOUR SENSORS. THE ELECTROSTATIC ANALYZER MEASURES ELECTRON PARAMETERS AT LEAST 1 METER ABOVE SATELLITE SURFACE. THE ION RETARDING POTENTIAL ANALYZER HAS A BODY-MOUNTED ELECTROSTATIC TRAP WITH A CIRCULAR APERTURE TO MEASURE ION DENSITY AND TEMPERATURE. THE DRIFTMETER USES A PLANAR ELECTROSTATIC ION TRAP WITH A FOUR-QUADRANT COLLECTOR. THE CURRENT IS MEASURED IN PAIRS OF QUADRANTS AND DIFFERENCED TO PROVIDE PLASMA DRIFT VELOCITIES. THE SCINTILLATION MONITOR OBTAINS POWER SPECTRUM IRREGULARITIES BY AN ION TRAP WITH ELECTROMETER AND AMPLIFIERS CAPABLE OF MEASURING DC AND AC CURRENT FROM 20 HZ TO 12 KHZ.

***** ERBS-A*****

SPACECRAFT COMMON NAME- ERBS-A

ALTERNATE NAMES- AEM-9, EARTH RAD BUDGET SAT

NSDC ID- ERBS-A

LAUNCH DATE- 04/08/84

WEIGHT- 170. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 96.6 MIN

PERIAPSIS- 600. KM ALT

INCLINATION- 96. DEG

APOAISIS- 600. KM ALT

PERSONNEL

MG - D.S. DILLER

SC - R.A. SCHIFFER

PM - C.L. WAGNER, JR.

PS - R. CURRAN

NASA HEADQUARTERS

NASA HEADQUARTERS

NASA-GSFC

NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE (ERBS) IS A 2-YR MISSION TO GATHER REQUIRED RADIATION BUDGET DATA, AEROSOL DATA, AND OZONE DATA (RELATED TO THE CHLORINE CHEMISTRY PROCESS); AND TO ASSESS CLIMATE CHANGE AND OZONE DEPLETION. THE EXPERIMENTS ARE THE EARTH RADIATION BUDGET EXPERIMENT (ERBE), THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT II (SAGE II) AND THE HALOGEN OCCULTATION EXPERIMENT (HALOE). THE ERBS WILL BE CARRIED ON TWO TIROS-N SERIES MISSIONS.

----- ERBS-A, BARKSTROM-----

INVESTIGATION NAME- EARTH RADIATION BUDGET EXPERIMENT (ERBE)

NSDC ID- ERBS-A -01

INVESTIGATIVE PROGRAM
CODE 00

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

TL - D.R. BARKSTROM

NASA-LARC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET EXPERIMENT (ERBE) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENT WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE GLOBAL, ZONAL, AND REGIONAL BUDGETS ON MONTHLY TIME SCALES, EQUATOR-TO-POLE GRADIENTS, AND MONTHLY DIURNAL VARIATIONS OF REGIONAL SCALES. THE EARTH RADIATION BUDGET EXPERIMENT CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIRED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIND TO LIND, APPROXIMATELY 155 DEG. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO

0.94 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 0.5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH AN 80-DEG FIELD OF VIEW, EQUIVALENT TO A TENAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6-7-8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.2 TO 0.5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (0.5 TO 50 MICROMETERS), AND CHANNEL 8 MEASURES TOTAL RADIATION (0.2 TO 50 MICROMETERS). ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN ARM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SVT'CM OF THE EARLY 1980'S.' SEE APPENDIX B FOR A LIST OF ERBE INVESTIGATORS.

----- ERBS-A, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS (SAGE)

NSDC ID- ERBS-A -02

INVESTIGATIVE PROGRAM
CODE 00

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
UPPER ATMOSPHERE RESEARCH
ATMOSPHERIC PHYSICS

PERSONNEL

PI - W.P. MCCORMICK

OI - J.E. PLEASANTS

NASA-LARC

NASA-LARC

BRIEF DESCRIPTION

THE SAGE SENSOR IS A MULTI-SPECTRAL CHANNEL RADIOMETER WHICH MEASURES THE EXTINCTION OF SOLAR RADIATION INTENSITY DURING SOLAR OCCULTATION. AS THE SPACECRAFT EREPGES FROM THE EARTH'S SHADOW DURING EACH ORBIT, THE SENSOR ACQUIRES THE SUN AND MEASURES THE SOLAR INTENSITY IN WAVELENGTH BANDS CENTERED BETWEEN 0.300 AND 1.0 MICROMETERS AS IT SCANS THE SUN VERTICALLY. AS THE SPACECRAFT CONTINUES IN ORBIT, THE LINE OF SIGHT FROM THE SPACECRAFT TO THE RISING SUN SCANS THE EARTH'S ATMOSPHERE, RESULTING IN A MEASUREMENT OF THE ATTENUATED SOLAR INTENSITY AT DIFFERENT ATMOSPHERIC LAYERS. THE PROCEDURE THEN IS REPEATED IN A REVERSE SENSE DURING SPACECRAFT SUNSET. EACH SUNRISE AND SUNSET EVENT IS MONITORED FROM THE TOP OF THE CLOUDS TO APPROXIMATELY 150 KM ABOVE THE EARTH'S SURFACE. THE SENSOR HAS AN INSTANTANEOUS FIELD OF VIEW OF APPROXIMATELY 0.5 KM MEASURED AT THE HORIZON FOR A 600-KM ORBIT. THE DYNAMIC RANGE OF EACH RADIOMETRIC CHANNEL IS APPROXIMATELY 4000, AND THE UNCERTAINTY IN ANY RADIOMETRIC MEASUREMENT IS SPECIFIED TO BE LESS THAN 0.1 PERCENT OF THE UNATTENUATED SOLAR INTENSITY (THE SENSOR IS PARTIALLY SELF-CALIBRATING IN THAT A MEASUREMENT OF THE UNATTENUATED SOLAR INTENSITY IS MADE PRIOR TO EACH SPACECRAFT SUNSET AND FOLLOWING EACH SPACECRAFT SUNRISE). FURTHERMORE, ZERO INTENSITY LEVELS ARE REACHED EVERY TIME THE ELEVATION MIRROR SCANS OFF THE SUN. THE INSTRUMENT MODULE CONSISTS OF OPTICAL AND ELECTRONIC SUBASSEMBLIES MOUNTED SIDE BY SIDE. THE OPTICAL SUBASSEMBLY CONSISTS OF A FLAT SCANNING MIRROR, CASSEGRAIN OPTICS, AND A DETECTOR PACKAGE. THE ENTIRE OPTICAL SUBASSEMBLY IS GIMBALED IN AZIMUTH. THE AZIMUTH SERVO EMPLOYS SUN SENSORS DRIVEN TO NULL ON THE CENTER OF THE SUN TO A TOLERANCE OF PLUS OR MINUS 1 ARC MIN. AT THE BEGINNING OF A SUNRISE OR SUNSET EVENT, THE INSTRUMENT SLEWS IN AZIMUTH TO A POSITION TO ACQUIRE THE SUN. UPON ACQUISITION IN AZIMUTH, THE MIRROR SERVO SCANS IN ELEVATION UNTIL THE SUN IS ACQUIRED. THE SCAN RANGE IS THEN REDUCED TO SCANNING BACK AND FORTH ACROSS THE SOLAR IMAGE ONLY. THE SOLAR INPUT IS REFLECTED FROM THE SCAN MIRROR THROUGH THE CASSEGRAIN TELESCOPE, WHICH PRODUCES A SOLAR IMAGE UPON THE SCIENCE DETECTOR APERTURE. THIS IMAGE IS SCANNED ACROSS THE APERTURE BY THE MOTION OF THE SCAN MIRROR. THE RADIATION THROUGH THE APERTURE IS DISPENSED, AND THE BEAMS REPRESENTING THE WAVELENGTH BANDS ARE THEN COLLECTED AND APPLIED TO SILICON PIN DIODE DETECTORS. THE OUTPUTS OF THE DETECTORS ARE FED TO SIGNAL CONDITIONING AMPLIFIERS WHOSE OUTPUTS GO TO THE PCM ENCODER. THE PCM ENCODER MULTIPLIES AND DIGITIZES THE SIGNALS AND THEN TRANSFERS THE DIGITAL DATA TO THE ERBS DATA SYSTEM. THE RADIOMETRIC DATA FOR EACH WAVELENGTH CHANNEL IS SAMPLED 64 TIMES PER 1 OR APPROXIMATELY 4 TIMES PER KM OF TANGENT ALTITUDE, AND IS DIGITIZED TO 12 BITS; THESE DATA, PLUS SCIENCE SUPPORTING DATA AND INSTRUMENT MODULE HOUSEKEEPING DATA, TOTAL APPROXIMATELY 6 KOPS.

----- ERBS-A, RUSSELL, 300-----

INVESTIGATION NAME- HALOGEN OCCULTATION (HALOE)

NSDC ID- ERBS-A -03

INVESTIGATIVE PROGRAM
CODE 00

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - J.M. RUSSELL, 3RD
OI - C.W. COFFEY, JR.

NASA-LARC
NASA-LARC

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN OPTICS UNIT, SUPPORTED ON A TWO-AXIS GIMBAL, AND AN ELECTRONICS UNIT. THE OPTICS UNIT CONTAINS THE OPTICS, MODULATORS, DETECTORS, AND PREAMPS FOR THE GAS DETECTION CHANNELS AND RADIOMETER CHANNELS. THE GIMBAL ASSEMBLY PROVIDES AZIMUTH AND ELEVATION ROTATION OF THE OPTICS UNIT WITH PLUS OR MINUS 185 DEG AZIMUTH RANGE AND A 38 DEG RANGE OF ELEVATION ANGLE CONTROL, AND IS CONTROLLED BY COARSE AND FINE SUN SENSORS INCLUDED IN THE OPTICS UNIT. THE ELECTRONICS UNIT PROVIDES SIGNAL PROCESSING, MOTOR DRIVES, SEQUENCE TIMING, MODE CONTROL, POWER CONDITIONING, AND DATA HANDLING. A 16-CM-DIAMETER REFLECTIVE CASSEGRAIN TELESCOPE COLLECTS ENERGY FOR THE GAS DETECTION CHANNELS. THE INSTANTANEOUS FIELD OF VIEW (IFOV) IS DETERMINED BY A FIELD STOP AT THE FOCAL POINT OF THE TELESCOPE, AND THE ENERGY IS MODULATED BY A CHOPPER SIMILAR TO THAT OF THE MONITORING AIR POLLUTION FROM SATELLITES (MAPS) INSTRUMENT. A HOT REFERENCE BLACKBODY SOURCE IS USED TO APPROXIMATELY BALANCE THE SOLAR ENERGY LEVELS WHEN THE CHOPPER DISC IS IN THE CLOSED (REFLECTIVE) POSITION. AN OPTICAL SIGNAL, PROVIDED AND PROCESSED IN A SIMILAR MANNER AS THE MAPS INSTRUMENT, IS USED TO MAINTAIN GAIN BALANCE OF THE DETECTOR BRANCHES. THE OPTICAL BEAM IS SEPARATED BY BEAMSPLITTERS INTO THE GAS CORRELATION AND RADIOMETER MODULES. THE OUTPUT SIGNALS FROM THE GAS CORRELATION MODULES ARE SENT TO THE SIGNAL PROCESSOR, WHICH IS SIMILAR TO THE MAPS SIGNAL PROCESSOR. THE OUTPUT SIGNALS FROM THE RADIOMETER MODULES ARE SENT TO A STANDARD RADIOMETER SIGNAL PROCESSOR. A STEPPER-DRIVEN CALIBRATION WHEEL IS PROVIDED IN FRONT OF THE TELESCOPE FIELD STOP TO PROVIDE MEASUREMENTS OF GAS RESPONSE, RADIO-METRIC CALIBRATION, AND INSTRUMENT BALANCE, USING THE EXOSPHERIC SUN AS AN ENERGY SOURCE. THE CALIBRATION WHEEL CONTAINS THREE GAS CELLS AND A NEUTRAL DENSITY FILTER FOR THESE MEASUREMENTS. THE SIGNAL-PROCESSING AND MOTOR-DRIVE ELECTRONICS ARE SIMILAR TO THOSE OF THE MAPS INSTRUMENT. THE REMAINING ELECTRONICS ARE CONVENTIONAL AND STRAIGHTFORWARD, WITH NO CRITICAL DESIGN AREAS. THE PROPOSED GIMBAL ASSEMBLY IS A STEPPER-DRIVEN, TWO-AXIS (AZIMUTH, ELEVATION) ASSEMBLY THAT SUPPORTS THE OPTICS UNIT NEAR THE CENTER OF GRAVITY OF THE INSTRUMENT. THE GIMBALS PROVIDE A CAPABILITY FOR FINE TRACKING. TRACKING CONTROL SIGNALS FOR THE GIMBALS ARE DERIVED FROM THE SUN SENSORS. THE FINE SUN SENSOR IS A TWO-AXIS DIGITAL SENSOR USING RETICON LINEAR ARRAY DETECTORS WITH 256 ELEMENTS PER AXIS GIVING .33 ARC MIN RESOLUTION. THE COARSE SUN SENSOR IS AN ANALOG TWO-AXIS DEVICE SIMILAR TO AN EXISTING ADOLFE SUN SENSOR. THE COARSE SENSOR PROVIDES SUN ACQUISITION SIGNALS OVER A PLUS OR MINUS 10 DEG FOV.

***** EUVE*****

SPACECRAFT COMMON NAME- EUVE
ALTERNATE NAMES- EXTREME UV EXPLORER, BERKSAT

NSSDC ID- EUVE

LAUNCH DATE- 12/03/85
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 95.0 MIN
PERIAPSIS- 550. KM ALT
INCLINATION- 28.5 DEG
APOAPSIS- 550. KM ALT

PERSONNEL
MG - M.D. WEINREB
SC - E.J. WEILER
PM - J. KING
PS - R.A. STERN
NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

EXTREME ULTRAVIOLET EXPLORER (EUVE) IS A SPINNING SPACECRAFT DESIGNED TO ROTATE ABOUT THE EARTH/SUN LINE. THE SPACECRAFT OBJECTIVE IS TO CARRY OUT A FULL-SKY SURVEY IN THE EXTREME ULTRAVIOLET RANGE OF THE SPECTRUM BETWEEN 7.5 AND 53 NM, FOR PURPOSES OF DISCOVERING AND STUDYING ULTRAVIOLET SOURCES RADIATING IN THIS REGION AND TO ANALYZE EFFECTS ON THE RADIATION FROM THESE SOURCES CAUSED BY THE INTERSTELLAR MEDIUM. IN ADDITION, A SMALLER FRACTION OF THE CELESTIAL SPHERE WILL BE SCANNED IN FOUR BANDPASSES, AT A GAIN IN SENSITIVITY OF APPROXIMATELY 100 OVER THE ALL-SKY SURVEY. THIS WILL INCLUDE THE THREE BANDPASSES OF THE ALL-SKY SURVEY, PLUS A 60-90 NM BAND SUITABLE FOR DETECTING ONLY THE NEAREST OBJECTS.

----- EUVE, BOWEN-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET FULL-SKY SURVEY

NSSDC ID- EUVE -01
INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - C.S. BOWEN
OI - R. MALINA
CI - F. PARESCE
OI - M. MEETDERKS

U OF CALIF, BERKELEY
U OF CALIF, BERKELEY
U OF CALIF, BERKELEY
U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS INVESTIGATION IS DESIGNED TO PERFORM A FULL-SKY SURVEY, SEARCHING FOR EXTREME ULTRAVIOLET (EUV) SOURCES. THE INSTRUMENT PACKAGE CONTAINS FOUR WOLTER-SCHWARTZSCHILD GRAZING-INCIDENCE TELESCOPES (W/IN EUV THIN-FILM FILTERS) TO COLLECT AND ISOLATE RADIATION. THE DETECTOR SYSTEM FOR EACH TELESCOPE IS A RESISTOR ANODE IMAGE CONVERTER (RANICON), CONSISTING OF A MICROCHANNEL PLATE, A RESISTOR, AND DETECTOR AMPLIFIERS DESIGNED TO PRODUCE IMAGES OF SKY FIELDS IN SELECTED WAVELENGTH RANGES. THREE TELESCOPES ARE DESIGNED TO OPERATE AT RIGHT ANGLES TO THE SPIN AXIS AND TO CARRY OUT THE SKY SURVEY, OBSERVING IN THE WAVELENGTH RANGES 7.5 - 18 NM, 14 - 32 NM, AND 39 - 53 NM. THE FOURTH TELESCOPE OPERATES AT APPROXIMATELY 10 DEG FROM THE SPIN AXIS, IN THE WAVELENGTH RANGE 7.5 - 90 NM, AND IS DESIGNED TO OBSERVE SELECTED INTERESTING OBJECTS. AS THE EARTH MOVES AROUND THE SUN, THE AREA EXAMINED SHIFTS 1 DEG EACH DAY UNTIL THE ENTIRE CELESTIAL SPHERE IS EXAMINED.

***** EXOS-C*****

SPACECRAFT COMMON NAME- EXOS-C
ALTERNATE NAMES- EXOSPHERIC SAT. C

NSSDC ID- EXOS-C

LAUNCH DATE- 02/08/84
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-35

WEIGHT- 200. KG

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 98. MIN
PERIAPSIS- 320. KM ALT
INCLINATION- 65. DEG
APOAPSIS- 1000. KM ALT

PERSONNEL
PM - T. ITOH
PS - M. OYA
PS - T. OGAWA
U OF TOKYO
U OF TOMOKU
U OF TOKYO

BRIEF DESCRIPTION

THE PURPOSE OF THIS SPACECRAFT IS TO PERFORM REMOTE SENSING OF THE MINOR CONSTITUENTS OF THE MIDDLE ATMOSPHERE AND TO STUDY THE WAVE-PARTICLE INTERACTIONS IN THE IONOSPHERIC PLASMA IN THE SOUTH AMERICAN ANOMALY AND THE AURORAL ZONES. THIS MISSION WILL BE PART OF THE MIDDLE ATMOSPHERE PROGRAM (MAP).

----- EXOS-C, DOKE-----

INVESTIGATION NAME- MONITOR OF HIGH ENERGY PARTICLES

NSSDC ID- EXOS-C -08
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. DOKE
OI - M. MURAKAMI
OI - K. NAGATA
WASEDA U
RIKKYO U
TANAGAWA U

BRIEF DESCRIPTION

THIS EXPERIMENT MONITORS THE ENERGY SPECTRA AND FLUX OF ELECTRONS, PROTONS AND ALPHA PARTICLES WITH ENERGIES HIGHER THAN 50 KEV USING SOLID-STATE DETECTORS.

----- EXOS-C, MAKINO-----

INVESTIGATION NAME- LIMB SCANNING IR RADIOMETER

NSSDC ID- EXOS-C -01
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T. MAKINO
OI - M. YAMAMOTO
OI - M. SEKIGUCHI
RIKKYO U
RIKKYO U
RIKKYO U

BRIEF DESCRIPTION

THIS INVESTIGATION USES A LIMB SCANNING RADIOMETER TO MEASURE THE 1.27 MICRON ATMOSPHERIC BAND TO DEDUCE THE OZONE DENSITY IN THE 70-90 KM ALTITUDE RANGE.

----- EXOS-C, MUKAI -----

INVESTIGATION NAME- PRECIPITATING PARTICLE ENERGY ANALYZER

NSSDC ID- EXOS-C -04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - T.	MUKAI	U OF TOKYO
O1 - M.	KUDO	U OF TOKYO
O2 - T.	ITOH	U OF TOKYO
O3 - K.	MIRAO	U OF TOKYO
O4 - N.	KAYA	KOBE U
O5 - M.	NATSUMOTO	KOBE U

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT IS TO MEASURE THE ENERGY SPECTRUM OF PRECIPITATING ELECTRONS AND PROTONS WITH ELECTROSTATIC ANALYZERS.

----- EXOS-C, NAKAMURA -----

INVESTIGATION NAME- INFRARED SOLAR SPECTROMETER

NSSDC ID- EXOS-C -03

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - Y.	NAKAMURA	U OF TOKYO
O1 - A.	NATSUZAKI	U OF TOKYO
O2 - T.	ITOH	U OF TOKYO

BRIEF DESCRIPTION

THIS INVESTIGATION USES AN IR SPECTROMETER TO MEASURE THE LIMB ABSORPTION OF THE SOLAR SPECTRUM TO OBTAIN PROFILES OF STRATOSPHERIC WATER VAPOR, METHANE, CARBON DIOXIDE, AND NITROUS OXIDE.

----- EXOS-C, OGAWA -----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER

NSSDC ID- EXOS-C -02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - T.	OGAWA	U OF TOKYO
O1 - K.	SUZUKI	U OF TOKYO
O2 - N.	IWAGAMI	U OF TOKYO

BRIEF DESCRIPTION

THIS INVESTIGATION INVOLVES THE MEASUREMENT OF BACKSCATTERED UV (2500-3500 Å) TO OBTAIN PROFILES OF THE OZONE DENSITY IN THE 25-60 KM ALTITUDE RANGE.

----- EXOS-C, OYA -----

INVESTIGATION NAME- TOPSIDE PLASMA SOUNDER

NSSDC ID- EXOS-C -06

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M.	OYA	U OF TOMOKU
O1 - A.	MORIOKA	U OF TOMOKU
O2 - T.	YOSHINO	U OF ELECTRO-COMMUN

BRIEF DESCRIPTION

THIS EXPERIMENT USES A TOPSIDE SOUNDER WITH A RECEIVER THAT CAN MEASURE IONOSPHERIC ELECTRON DENSITY PROFILES, RADIO WAVES EMANATING FROM THE PLANETS AND THE HIGHER HARMONIC EMISSIONS FROM TERRESTRIAL ELECTRIC POWER LINES.

----- EXOS-C, TAKAGI -----

INVESTIGATION NAME- SOLAR IMAGE-RADIOMETER

NSSDC ID- EXOS-C -05

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M.	TAKAGI	NAGOYA U
O1 - Y.	KONDO	NAGOYA U

BRIEF DESCRIPTION

THIS INVESTIGATION USES A SOLAR IMAGE RADIOMETER IN SEVERAL VISIBLE AND NEAR-INFRARED BANDS TO MEASURE THE LIMB ABSORPTION OF THE SOLAR SPECTRUM TO OBTAIN VERTICAL PROFILES OF STRATOSPHERIC AEROSOLS AND OZONE.

----- EXOS-C, TAKAHASHI -----

INVESTIGATION NAME- PLASMA PROBES

NSSDC ID- EXOS-C -07

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - T.	TAKAHASHI	U OF TOMOKU
O1 - M.	OYA	U OF TOMOKU
O2 - K.	MIRAO	U OF TOKYO
O3 - K.	OYAMA	U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT USES PLASMA PROBES TO MEASURE ELECTRON DENSITY AND ELECTRON TEMPERATURE.

***** EXOSAT *****

SPACECRAFT COMMON NAME- EXOSAT

ALTERNATE NAMES- HILBECEN LUN OCCULT.SAT., EUROPEAN X-RAY OBS S
HELOS

NSSDC ID- EXOSAT

LAUNCH DATE- 07/09/82

WEIGHT- 500. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE

LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY

INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GECENTRIC

ORBIT PERIOD- 5767. MIN

INCLINATION- 70. DEG

PERIAPSIS- 300. KM ALT

APOAISIS- 200000. KM ALT

PERSONNEL

PM - G.	ALTMANN	ESA-ESTEC
PS - H.D.	ANDRESEN	ESA-ESTEC
PS - A.	PEACOCK	ESA-ESTEC

BRIEF DESCRIPTION

THE SCIENTIFIC MISSION OF THE EUROPEAN X-RAY OBSERVATORY SATELLITE (EXOSAT) IS TO MEASURE THE POSITION, STRUCTURAL FEATURES, AND SPECTRAL AND TEMPORAL CHARACTERISTICS OF COSMIC X-RAY SOURCES IN THE RANGE FROM APPROXIMATELY 0.1 KEV TO 50 KEV. EXOSAT USES TWO OPERATIONAL MODES: (A) THE OCCULTATION MODE, FOR THE PRECISE DETERMINATION AND IDENTIFICATION OF SOURCES AND THE OBSERVATION OF STRUCTURAL FEATURES, USING PRIMARILY THE MOON OR THE EARTH AS THE OCCULTING BODY, AND (B) THE ARBITRARY POINTING MODE FOR THE STUDY OF THE TEMPORAL AND SPECTRAL VARIABILITY OF SOURCES OVER LONG UNINTERRUPTED TIME INTERVALS AND THE MAPPING OF LOW-ENERGY SOURCES. THE OBSERVATORY, PLACED IN A HIGHLY ECCENTRIC ORBIT WITH ITS APOGEE AT 200,000 KM AND AT A HIGH LATITUDE, IS CAPABLE OF OBSERVING LUNAR OCCULTATIONS OVER 20 PERCENT OF THE CELESTIAL SPHERE WITHIN A YEAR. THE POSITIONAL ACCURACY OF BRIGHT SOURCES (<0.1 OF-2 PHOTONS/50 CM-S IN THE RANGE GREATER THAN 1.5 KEV) IS LIMITED TO ABOUT 1 ARC S BY THE INACCURACY OF MEASUREMENT OF THE POSITION OF THE SATELLITE AND THE UNCERTAINTY OF THE TOPOGRAPHY OF THE LUNAR LIMB. FOR WEAKER SOURCES, THE ACCURACY IS LIMITED BY STATISTICS; I.E., THE TOTAL NUMBER OF X-RAY QUANTA RECEIVED DURING THE TIME OF THE CORRESPONDING ANGULAR DISPLACEMENT OF THE MOON. WHEN NOT ENGAGED IN OCCULTATION OBSERVATIONS, THE OBSERVATORY CAN VIEW THE SKY UNINTERRUPTEDLY IN ANY CHOSEN DIRECTION (EXCEPT 60 DEG ABOUT THE SOLAR DIRECTION) FOR AS LONG AS THE ORBITAL PERIOD IS ABOVE THE VAN ALLEN BELTS (APPROXIMATELY 80 M). WITH ACCURATE TIMEKEEPING ON BOARD, AND WITH THIS CAPABILITY OF LONG CONTINUOUS OBSERVATION, EXOSAT CAN DETERMINE REGULAR AND IRREGULAR VARIATIONS OF THE INTENSITY OF X-RAY SOURCES ON A TIME SCALE RANGING FROM TENS OF MICROSECONDS TO TENS OF HOURS. THE TRIAXIAL STABILIZED SPACECRAFT IS A CYLINDER WITH A DIAMETER OF 192 CM AND A HEIGHT OF 117 CM. A ROTATABLE SOLAR ARRAY WITH AN AREA OF 350 M² IS MOUNTED ON TOP OF THE SPACECRAFT. THE STAR TRACKERS ARE MOUNTED ON THE OPTICAL BENCHES OF THE TWO IMAGING TELESCOPES TO FACILITATE ALIGNMENT AND STABILITY. IN THE OCCULTATION AND ARBITRARY POINTING MODES, THE OBSERVATORY IS ABLE TO VIEW ALL OF THE CELESTIAL SPHERE EXCLUDING A CONE CENTERED ON THE SUN OF 15 DEG AND 60 DEG HALF ANGLE, RESPECTIVELY. CONSUMABLES ARE DIMENSIONED TO ENABLE SOME 100 ORBITAL MANEUVERS FOR LUNAR OCCULTATION TO BE UNDERTAKEN AND OVER 2000 TARGETS TO BE OBSERVED. THE SCIENTIFIC PAYLOAD IS FUNDED BY ESA AND ITS DEVELOPMENT MANAGED BY ESA. USE OF THE OBSERVATORY IS OPEN TO THE SCIENTIFIC COMMUNITY FOLLOWING SELECTION OF OBSERVATIONAL PROPOSALS.

----- EXOSAT, BOYD-----

INVESTIGATION NAME- LOW-ENERGY X-RAY IMAGING TELESCOPES

NSSDC ID- EXOSAT -02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - R.L.F. BOYD	U COLLEGE LONDON
TM - P.W. SANFORD	U COLLEGE LONDON
TM - B.N. SWANENBURG	U OF LEIDEN
TM - J.A.M. BLEEKER	U OF LEIDEN
TM - C. DE JAGER	U OF UTRECHT
TM - A.C. BRINKMAN	U OF UTRECHT

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF TWO IDENTICAL IMAGING TELESCOPES MADE BY SETS OF TWO NESTED GRATING-INCIDENCE PARABOLIC/HYPERBOLIC REFLECTORS WITH A FOCAL-PLANE ASSEMBLY INCORPORATING A GAS-FLOW POSITION-SENSITIVE PROPORTIONAL COUNTER AND A CHANNEL-MULTIPLIER ARRAY, COVERING THE ENERGY RANGE FROM THE EUV TO 2.5 KEV, WHICH IS LIMITED BY THE REFLECTING OPTICS. AT THE EXIT PLANE OF THE MIRROR, A TRANSMISSION GRATING IS LOCATED FOR SPECTROSCOPIC MEASUREMENTS.

----- EXOSAT, TAYLOR-----

INVESTIGATION NAME- GAS SCINTILLATION X-RAY SPECTROMETER

NSSDC ID- EXOSAT -03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - B.G. TAYLOR	ESA-ESTEC
TM - R.D. ANDRESEN	ESA-ESTEC
TM - R.L.F. BOYD	U COLLEGE LONDON
TM - P.W. SANFORD	U COLLEGE LONDON
TM - L. SCARSI	U OF PALERMO
TM - S. SALEHI	U OF PALERMO
TM - G. BOELLA	U OF MILAN
TM - G. VILLA	U OF MILAN
TM - A. PLACOCK	ESA-ESTEC

BRIEF DESCRIPTION

A GAS SCINTILLATION PROPORTIONAL COUNTER SPECTROMETER IS USED TO STUDY DETAILED SPECTRAL FEATURES IN THE ENERGY RANGE FROM 2.5 TO 50 KEV. THE DEVICE HAS AN EFFECTIVE AREA OF 250 SQ CM AND AN ENERGY RESOLUTION OF BETTER THAN 10 PERCENT AT 6 KEV. THE COUNTER WINDOW IS A 400-MICROMETER BERYLLIUM FOIL AND THE GAS FILLING IS 70 PERCENT NE AND 30 PERCENT AR.

----- EXOSAT, TRUMPER-----

INVESTIGATION NAME- MEDIUM-ENERGY COSMIC X-RAY PACKAGE

NSSDC ID- EXOSAT -01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - J. TRUMPER	HPI-EXTRATERM PHYS
TM - M. ZIMMERMAN	HPI-EXTRATERM PHYS
TM - R. STAUBERT	U OF TUBINGEN
TM - F.A. POUNDS	U OF LEICESTER
TM - M. TURNER	U OF LEICESTER

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ARRAY OF ARGON-FILLED PROPORTIONAL COUNTERS BACKED UP BY XENON-FILLED COUNTERS WITH AN EFFECTIVE AREA OF 2,000 SQ CM, COVERING THE ENERGY RANGE FROM 1.2 TO 50 KEV. THE ARRAY IS DIVIDED INTO FOUR SECTIONS, EACH OF WHICH CAN BE OFFSET FROM THE POINTING DIRECTION TO PROVIDE FOR A VARIABLE FLAT-TOP COLLIMATOR RESPONSE. THE COLLIMATORS PROVIDE A FIELD OF VIEW OF 45 ARC MIN AND THE DETECTORS HAVE AN ENERGY RESOLUTION OF 20 PERCENT AT 6 KEV FOR ARGON AND 22 KEV FOR XENON.

***** GALILEO ORBITER*****

SPACECRAFT COMMON NAME- GALILEO ORBITER

ALTERNATE NAMES- JUPITER ORBITER PROBE, JO;
GALILEO

NSSDC ID- JOPO

LAUNCH DATE- 03/26/85 WEIGHT- 680. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-GSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- JUPITER ORBITER	
ORBIT PERIOD- 86800. MIN	INCLINATION- 0.0 DEG
PERIAP313- 425000. KM ALT	APOAP313- 984000. KM ALT

PERSONNEL

MG - D.R. MCCULLAR	NASA HEADQUARTERS
SC - R.E. MURPHY	NASA HEADQUARTERS
PM - J. CASANI	NASA-JPL
PM - W.S. SHIPLEY	NASA-JPL
PS - T.V. JOHNSON	NASA-JPL

BRIEF DESCRIPTION

THE GALILEO MISSION CONSISTS OF A JUPITER ORBITER AND A SEPARATE JUPITER ATMOSPHERIC ENTRY PROBE. THE ORBITER WILL BE LAUNCHED FROM THE SHUTTLE WITH A CENTAUR UPPER STAGE AND WILL USE A MARS-POWERED FLYBY. THE ORBITER Serves AS A RELAY LINK TO EARTH FROM THE PROBE. THE ORBITER POWER SOURCES ARE TWO MODULAR 250-W SELENIUM ISOTOPE GENERATORS (SIG) THAT PROVIDE 20 V OF DC CURRENT TO ALL SUBSYSTEMS AND A TOTAL POWER OF 500 W. TEMPERATURE IS CONTROLLED BY RADIOISOTOPE HEATER UNITS (RHU'S). TELEMETRY IS BY A TWO-CHANNEL DOWNLINK, ONE FOR CONTINUOUS TRANSMISSION OF FIXED FORMAT (6.25 OPS) ON THE S-BAND, AND THE OTHER FOR REAL-TIME PLAYBACK DATA AT RATES BETWEEN 2 AND 120 KBS ON THE X-BAND.

----- GALILEO ORBITER, ANDERSON-----

INVESTIGATION NAME- RADIO SCIENCE

NSSDC ID- JOPO -11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
RADIO PHYSICS
PLANETARY ATMOSPHERES
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - J.D. ANDERSON	NASA-JPL
TM - V.R. ESHLEMAN	STANFORD U
TM - F.B. ESTABROOK	NASA-JPL
TM - G. FJELDBO	NASA-JPL
TM - E. GERARD	PARIS OBSERVATORY
TM - S. GULNIS	NASA-JPL
TM - A.J. KLIORE	NASA-JPL
TM - R. WOO	NASA-JPL
TM - G.F. LINDAL	NASA-JPL

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE (1) TO INVESTIGATE THE HIGH-ALTITUDE NEUTRAL ATMOSPHERE OF JUPITER, USING OCCULTATION TECHNIQUES TO MEASURE PRESSURE, TEMPERATURE, MOLECULAR WEIGHT, AND TURBULENCE; (2) TO INVESTIGATE THE IONOSPHERE OF JUPITER AND ITS INTERACTION WITH THE MAGNETOSPHERE, USING OCCULTATION TECHNIQUES TO DETERMINE ELECTRON NUMBER DENSITY AND PLASMA SCALE HEIGHT; (3) TO DETERMINE THE SIZES AND SHAPES OF THE GALILEAN SATELLITES; (4) TO SEARCH FOR AND CHARACTERIZE ATMOSPHERES AND IONOSPHERES OF THE GALILEAN SATELLITES AND STUDY THEIR INTERACTIONS WITH THE JOVIAN MAGNETOSPHERE; (5) TO DETERMINE THE STRUCTURE OF THE GRAVITATIONAL FIELD OF JUPITER FROM DOPPLER TRACKING; (6) TO DETERMINE THE MASSES AND GRAVITATIONAL MOMENTS OF THE GALILEAN SATELLITES AND IMPROVE KNOWLEDGE OF THEIR ORBITS; (7) TO STUDY TURBULENCE, ELECTRON DENSITY FLUCTUATIONS, AND WINDS IN THE JOVIAN IONOSPHERE; (8) TO INVESTIGATE MICROWAVE EMISSION FROM THE ATMOSPHERE AND TRAPPED RADIATION BELTS OF JUPITER; AND (9) TO SEARCH FOR VLF GRAVITATIONAL WAVES INCIDENT ON THE SOLAR SYSTEM TO A LEVEL OF STRAIN AMPLITUDE APPROXIMATELY 1E-15. INVESTIGATORS USE THE SIGNALS TRANSMITTED BETWEEN THE EARTH AND THE ORBITER AND BETWEEN THE PROBE AND THE ORBITER TO CARRY OUT THEIR INVESTIGATIONS. THE EARTH-ORBITER COMMUNICATIONS USE AN S-BAND (2115 MHZ) UPLINK AND TRANSPONDER TO GENERATE A COHERENT S-X BAND DOWNLINK (2297 MHZ AND 8422 MHZ), USING AN EARTH-ORIENTED S-M DISH ANTENNA. THE FREQUENCY STABILITY IS APPROXIMATELY 1 PART IN 1E+11. THE PROBE-TO-ORBITER TRANSMISSION IS AT A FREQUENCY BETWEEN 1 AND 2 GHZ, USING A WIDE-BAND RECEIVER AND BODY-FIXED 1-M DISH ANTENNA. FOLLOWING THE PROBE MISSION, THIS RECEIVER AND ANTENNA ARE AVAILABLE TO CARRY OUT ADDITIONAL INVESTIGATIONS. INDIVIDUAL INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- GALILEO ORBITER, BELTON-----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- JOPO -10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL

TL - M.J.S. DELTON
 TM - C.D. ANGER
 TM - C.R. CHAPMAN
 TM - M.E. DAVIES
 TM - R. GREENLEY
 TM - R. GREENBERG
 TM - J.W. HEAD, SRD
 TM - R. NEUMUM
 TM - R. SCHUBERT
 TM - C.B. PILCHER
 TM - J. VEVERKA
 TM - M.W. CARR
 TM - J.B. WELLMAN

KITT PEAK NATL OBS
 U OF CALGARY
 PLANETARY SCIENCE INST
 RAND CORP
 ARIZONA STATE U
 PLANETARY SCIENCE INST
 BROWN U
 MPI-NUCLEAR PHYS
 U OF CALIF, LA
 U OF HAWAII
 CORNELL U
 US GEOLOGICAL SURVEY
 NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO STUDY JUPITER AND ITS SATELLITES THROUGH MULTI-SPECTRAL, HIGH-RESOLUTION IMAGING WITH A CHARGED-COUPLED DEVICE (CCD) CAMERA. SPECIFIC SCIENCE OBJECTIVES ARE (1) TO INVESTIGATE THE STRUCTURE OF THE JOVIAN ATMOSPHERE AND CLOUDS THROUGH MULTI-SPECTRAL PHOTOMETRY AND POLARIMETRY; (2) TO INVESTIGATE THE DYNAMICS OF THE JOVIAN ATMOSPHERE THROUGH SYNOPSIS IMAGING OF CLOUD STRUCTURES; (3) TO MEASURE THE SIZES AND SHAPES OF THE GALILEAN SATELLITES AND DETERMINE THEIR LIBRATIONS; (4) TO MAP THE SURFACE MORPHOLOGY OF THE GALILEAN SATELLITES AT A SPATIAL RESOLUTION BETTER THAN 1 KM AND OVER A RANGE OF VIEWING AND LIGHTING ANGLES IN ORDER TO INVESTIGATE THE GEOLOGICAL PROCESSES THAT HAVE ACTED ON THEIR SURFACES; (5) TO USE MULTISPECTRAL IMAGING TO IDENTIFY AND MAP THE DISTRIBUTION OF ICES AND MINERALS ON THE SURFACES OF THE SATELLITES; (6) TO SEARCH FOR AURORAL OR OTHER ATMOSPHERIC EMISSION ON THE NIGHT SIDE OF JUPITER, ON THE SATELLITES, AND IN CIRCUM-JOVIAN SPACE; AND (7) TO SEEK TARGETS OF OPPORTUNITY FOR IMAGING THE IRREGULAR SATELLITES OF JUPITER. THE IMAGING INVESTIGATION USES A SINGLE CAMERA CONSISTING OF A 1500-NANOMETER FOCAL LENGTH CATADIOPTRIC TELESCOPE IMAGING ONTO AN 800 X 500 ELEMENT CCD. OPTICS ARE FUSED SILICON. AN EIGHT-POSITION FILTER WHEEL (FILTERS NOT SPECIFIED) IS USED. THE SPECTRAL RESPONSE IS 350 TO 1100 NANOMETERS. THE RESOLUTION IS 20 MICRORAD PER LINE PAIR. THE FIELD OF VIEW IS 0.098 RAD (0.46 DEG). THE MINIMUM EXPOSURE IS 5 MILLISECOND, AND THE MAXIMUM FRAME RATE IS ABOUT 1/MIN. THE LINEAR DYNAMIC RANGE EXCEEDS 1000, WITH 8 BIT/PIXEL ENCODING. THE INSTRUMENT IS MOUNTED ON THE SCAN PLATFORM OF THE ORBITER. THE TOTAL MASS IS 25 KG AND THE TOTAL CONTINUOUS POWER IS 23 W. INDIVIDUAL INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- GALILEO ORBITER, CARLSON-----

INVESTIGATION NAME- NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER

NSSDC ID- JOPO -01 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY
 ATMOSPHERIC PHYSICS
 PLANETARY ATMOSPHERES
 GEODESY AND CARTOGRAPHY

PERSONNEL

PI - R.W. CARLSON
 OI - T.V. JOHNSON
 OI - G.E. DANIELSON
 OI - P.P. FANALE
 OI - M.W. KIEFFER
 OI - J.S. LEWIS
 OI - M. MASURSKY
 OI - D.L. MATSON
 OI - T.B. MCCORD
 OI - L.A. SODERBLOM
 OI - F. TAYLOR

NASA-JPL
 NASA-JPL
 CALIF INST OF TECH
 NASA-JPL
 US GEOLOGICAL SURVEY
 MASS INST OF TECH
 US GEOLOGICAL SURVEY
 NASA-JPL
 U OF HAWAII
 US GEOLOGICAL SURVEY
 NASA-JPL

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE (1) TO MAP THE MINERAL DISTRIBUTION ON THE SURFACES OF THE SATELLITES OF JUPITER AT A SPATIAL RESOLUTION OF 5 TO 30 KM, (2) TO IDENTIFY THE INDIVIDUAL PHASES AND MIXTURES PRESENT, (3) TO RELATE THE MINERALOGICAL PROVINCES TO GEOLOGICAL PROVINCES OBSERVED WITH THE IMAGING SYSTEM, AND (4) TO MAP REGIONS OF THE JOVIAN ATMOSPHERE OVER A WIDE RANGE OF PHASE ANGLES TO DETERMINE CLOUD MORPHOLOGY AND VERTICAL STRUCTURE. THE INSTRUMENT IS A HIGH-SPEED SCANNING REFLECTION-GRATING SPECTROMETER MOUNTED ON THE SCAN PLATFORM OF THE ORBITER. IMAGING IS DONE BY A 20-CM APERTURE TELESCOPE ONTO AN INSB DETECTOR ARRAY IN ORDER TO PRODUCE MULTI-SPECTRAL LINE IMAGES OF SOURCES WITHOUT EXTERNAL SCANNING. ANGULAR RESOLUTION IS 0.5 MILLIRAD AND THE SPECTRAL RANGE IS 0.9 TO 3.0 MICROMETERS IN 144 CHANNELS AT A SPECTRAL RESOLUTION OF 0.03 MICROMETERS. THE TOTAL MASS OF THE SPECTROMETER IS 11 KG AND THE TOTAL POWER IS 8 W.

----- GALILEO ORBITER, FANALE-----

INVESTIGATION NAME- FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES

NSSDC ID- JOPO -12

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY

PERSONNEL

PI - P.P. FANALE

NASA-JPL

BRIEF DESCRIPTION

THIS INVESTIGATION UTILIZES GALILEO ORBITER REMOTE SENSING DATA, PRIMARILY FROM THE IMAGING, NIMS, AND UVS INVESTIGATIONS, TO STUDY THE FORMATION CONDITIONS AND SUBSEQUENT GEOLOGICAL EVOLUTION OF THE GALILEAN SATELLITES, INCLUDING THE INTERACTION OF THESE BODIES WITH THEIR SPACE ENVIRONMENTS.

----- GALILEO ORBITER, FRANK-----

INVESTIGATION NAME- PLASMA

NSSDC ID- JOPO -04

INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 SPACE PLASMAS
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - L.A. FRANK
 OI - F.V. CORONITI
 OI - V.M. VASYLIUNAS

U OF IOWA
 U OF CALIF, LA
 MPI-ALRONOMY

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE (1) TO ESTABLISH THE SOURCES OF JOVIAN PLASMA; (2) TO INVESTIGATE PLASMA INTERACTIONS WITH THE JOVIAN SATELLITES; (3) TO INVESTIGATE THE ROLE OF PLASMA AS A SOURCE FOR ENERGETIC CHARGED PARTICLES IN THE RADIATION ZONES; (4) TO DETERMINE THE NATURE OF THE EQUATORIAL CURRENT SHEET; AND (5) TO EVALUATE THE ROLES OF MAGNETIC MERGING, CO-ROTATIONAL FORCES AND FIELD-ALIGNED CURRENTS IN THE DYNAMICS OF THE JOVIAN MAGNETOSPHERE. THE INVESTIGATION USES AN ELECTROSTATIC ANALYZER (QUADRISPHERICAL LEPEDEA) IN DETERMINING DIFFERENTIAL ENERGY SPECTRA OF BOTH POSITIVE IONS AND ELECTRONS WITH ESSENTIALLY COMPLETE ANGULAR COVERAGE IN 63 CONTIGUOUS PASSBANDS. THE FRACTIONAL ENERGY RESOLUTION IS 0.17 AND THE RANGE IS 1 EV TO 50 KEV. THREE MINIATURE MASS SPECTROMETERS AT THE ANALYZER EXIT APERTURE ARE USED FOR MASS ANALYSIS, WITH A FRACTIONAL MASS RESOLUTION OF 0.18, SUFFICIENT TO IDENTIFY H⁺, HE⁺, HE²⁺, NA⁺, K⁺, AND S⁺. THE ANALYZER IS MOUNTED ON A SHORT BOOM ON THE SPINNING SECTION OF THE ORBITER. THE TOTAL MASS (EXCLUDING THE BOOM) IS 6.9 KG, AND THE TOTAL POWER IS 7.2 W.

----- GALILEO ORBITER, GIERASCH-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC DYNAMICS

NSSDC ID- JOPO -13

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL

PI - P.J. GIERASCH

CORNELL U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO UTILIZE DATA FROM THE IMAGING AND NIMS INVESTIGATIONS ON THE ORBITER, TOGETHER WITH IN SITU ATMOSPHERIC DATA FROM THE PROBE, TO STUDY THE DYNAMICS OF THE ATMOSPHERE, WITH PARTICULAR EMPHASIS ON THE NATURE AND CAUSE OF THE HORIZONTAL TEMPERATURE GRADIENTS BENEATH THE CLOUDS.

----- GALILEO ORBITER, GRAND-----

INVESTIGATION NAME- ELECTRON ERITER

NSSDC ID- JOPO -05

INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS
 SPACE PLASMAS

PERSONNEL

PI - R.J.L. GRAND
 OI - S.E. DEFOREST
 OI - R.W. GOLDSTEIN
 OI - A. GONFALONE
 OI - D. JONES
 OI - K. KNOTT
 OI - A. PEDERSEN

ESA-ESTEC
 INT REMOTE SYS
 NASA-JPL
 ESA-ESTEC
 BRITISH ANTARCTIC SURV
 ESA-ESTEC
 ESA-ESTEC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO CLAMP THE POTENTIAL OF THE SPACECRAFT TO THAT OF THE SURROUNDING PLASMA AND MEASURE ELECTRON SATURATION CURRENT COLLECTED BY THE SPACECRAFT, AND TO INVESTIGATE THE LOW-ENERGY ELECTRON DENSITY AND TEMPERATURE, THE FLOATING POTENTIAL OF THE SPACECRAFT, AND THE CONDUCTION CURRENT OF ELECTROMAGNETIC AND ELECTROSTATIC WAVES UP TO THE LOCAL PLASMA FREQUENCY. THREE INDIRECTLY HEATED CATHODES WITH APPROPRIATE ELECTRONICS ARE MOUNTED ON THE DOPM SECTION OF THE ORBITER, WITH CATHODES ON A SHORT (90-CM) BOOM. THE TOTAL MASS (EXCLUDING THE BOOM) IS 1.0 KG AND THE TOTAL POWER IS 2.9 W.

----- GALILEO ORBITER, GRUN-----

INVESTIGATION NAME- DUST

NSSDC ID- JOPO -09

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PARTICLES AND FIELDS

PERSONNEL

PI - E. GRUN
OI - M. FECHTIG
OI - J. KISSEL
OI - M.A. LINDBLAD
OI - G. MORFILL
OI - M.A. ZOOK

RPI-MUCIFAR PHYS
RPI-NUCLEA. PHYS
RPI-NUCLEA. PHYS
LUND OBS
RPI-NUCLEA. PHYS
NASA-JSC

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE PHYSICAL AND DYNAMICAL PROPERTIES OF SMALL DUST PARTICLES IN THE JOVIAN ENVIRONMENT, WITH EMPHASIS ON THE INTERACTION OF DUST WITH THE MAGNETOSPHERE AND SATELLITE SURFACES. PARAMETERS MEASURED INCLUDE MASS, DIRECTION OF MOTION, AND CHARGE. THE INSTRUMENT PACKAGE CONSISTS OF ENTRANCE GRIDS FOR SENSING CHARGE, AN IMPACT PLASMA DETECTOR TO MEASURE PULSE HEIGHT AND RISE TIME FOR BOTH ELECTRONS AND IONS GENERATED BY IMPACT, AND APPROPRIATE ELECTRONICS. MASS AND VELOCITY ARE DERIVED FROM MEASUREMENTS BY EMPIRICAL RELATIONSHIPS DETERMINED IN GROUND-BASED CALIBRATIONS. THE IMPACT RATE RANGE IS 1.E-7 TO 1.E-2 PER S, THE PARTICLE MASS RANGE IS 1.E-16 TO 1.E-6 G, AND THE CHARGE RANGE IS 1.E-14 TO 1.E-10 C. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. ITS TOTAL MASS IS 4.2 KG, AND THE TOTAL POWER IS 1.7 W.

----- GALILEO ORBITER, GURNETT-----

INVESTIGATION NAME- PLASMA WAVE SPECTROMETER

NSSDC ID- JOPO -07

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.A. GURNETT
OI - R.E. GENDRIN
OI - C.F. KENNEL
OI - F.L. SCARF
OI - S.D. SHAWHAN

U OF IOWA
CNET
U OF CALIF, LA
TRW SYSTEMS GROUP
U OF IOWA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO MEASURE THE VARYING ELECTRIC AND MAGNETIC FIELDS IN THE JOVIAN PLASMA IN ORDER TO DETERMINE THE CHARACTERISTICS AND ORIGIN OF PLASMA WAVES IN THE MAGNETOSPHERE AND TO ANALYZE VARIOUS WAVE-PARTICLE INTERACTION PHENOMENA IN THE MAGNETOSPHERIC INTERACTIONS. THE INSTRUMENT PACKAGE INCLUDES A 2-M ELECTRIC DIPOLE ANTENNA FOR ELECTRIC FIELD MEASUREMENT AND TWO 27-CM SEARCH COIL MAGNETOMETERS, ONE FOR LOW-FREQUENCY (LESS THAN 10 KHZ) AND THE OTHER FOR HIGH-FREQUENCY MAGNETIC FIELD MEASUREMENTS. THERE IS ALSO A 20-CHANNEL SPECTRUM ANALYZER COVERING THE RANGE 5.6 HZ TO 311 KHZ, WITH 4 CHANNELS PER DECADE AND A HIGH-RATE WAVEFORM RECEIVER TO BE USED DURING SELECTED PERIODS. SENSORS ARE MOUNTED AS A SINGLE UNIT IN A BOOM APPROXIMATELY 2-M LONG ON THE SPINNING SECTION OF THE ORBITER. ELECTRONICS ARE MOUNTED NEAR THE BASE OF THE BOOM. THE TOTAL MASS OF THE PACKAGE IS 3.1 KG (1.2 KG FOR THE SENSORS AND 1.9 KG FOR ELECTRONICS). THE TOTAL POWER IS 2.8 W.

----- GALILEO ORBITER, HORD-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER (UVS)

NSSDC ID- JOPO -02

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.W. HORD
OI - C.A. BARTH
OI - K.K. KELLY
OI - A.L. LANE
OI - A.L. STEWART
OI - G.E. THOMAS

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NASA-JPL
U OF COLORADO
U OF COLORADO

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIES THE COMPOSITION AND STRUCTURE OF THE HIGH NEUTRAL ATMOSPHERES OF JUPITER AND THE GALILEAN SATELLITES TO DETERMINE ATMOSPHERIC LOSS RATES FROM SATELLITES, STUDY MIXING RATIOS ON JUPITER OF HNS AND OF UV-ACTIVE TRACE CONSTITUENTS, AND INVESTIGATE AURORAL EMISSIONS AND INTERACTIONS BETWEEN ATMOSPHERES AND THE JOVIAN PLASMASPHERE. INSTRUMENTATION CONSISTS OF A PASTIE-EBERT UV SPECTROMETER (WAVELENGTH RANGE OF 110 TO 430 NANOMETERS) WITH A CASSEGRAIN TELESCOPE HAVING A 5-CM APERTURE, 25-CM FOCAL LENGTH, AND A PROGRAMMABLE GRATING. THE SPECTRUM IS MEASURED WITH MICROCHANNEL DETECTORS AT A FOV RESOLUTION OF 1.8 KM (1 NAUTICAL MILE) AT PERIAPSIS. THE SPECTROMETER IS MOUNTED ON THE ORBITER SCAN PLATFORM AND HAS A TOTAL MASS OF 3.4 KG. THE TOTAL POWER IS 4.2 W.

----- GALILEO ORBITER, HUNTER-----

INVESTIGATION NAME- STRUCTURE AND AERONOMY OF THE
ATMOSPHERES OF JUPITER AND ITS SATELLITES

NSSDC ID- JOPO -14

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.R. HUNTER

U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE HEAT BALANCE OF JUPITER'S ATMOSPHERE, TO ESTIMATE THE EDDY DIFFUSION COEFFICIENTS IN THE ATMOSPHERE, AND TO STUDY THE AERONOMY OF NEUTRAL AND IONIZED ATMOSPHERES (INCLUDING THOSE OF THE SATELLITES) BY USING DATA FROM A WIDE VARIETY OF PROBE AND ORBITER INSTRUMENTS.

----- GALILEO ORBITER, KIVELSON-----

INVESTIGATION NAME- MAGNETOMETER

NSSDC ID- JOPO -03

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PLANETOLOGY
MAGNETOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL

PI - M.G. KIVELSON
OI - P.J. COLEMAN, JR.
OI - C.F. KENNEL
OI - R.L. MCPHERSON
OI - C.T. RUSSELL

U OF CALIF, LA
U OF CALIF, LA
U OF CALIF, LA
U OF CALIF, LA
U OF CALIF, LA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO STUDY THE JOVIAN MAGNETIC FIELD IN ORDER TO MAP THE CONFIGURATION OF THE MAGNETOSPHERE AND ANALYZE ITS DYNAMICS, INVESTIGATE MAGNETOSPHERIC-IONOSPHERIC COUPLING, MEASURE MAGNETIC FLUCTUATIONS, SEARCH FOR MAGNETIC FIELDS ON THE SATELLITES, AND INVESTIGATE THE PROPERTIES OF THE SATELLITES AND THEIR INTERACTIONS WITH THE AMBIENT MEDIUM. THE INSTRUMENT PACKAGE INCLUDES DUAL TRIAXIAL FLUXGATE MAGNETOMETERS WITH A DYNAMIC RANGE OF 2.5E-12 TO 1.6E-5 TESLAS (0.0025 TO 1.6E4 GAMMAS), MOUNTED ON A BOOM ON THE SPINNING PART OF THE ORBITER SPACECRAFT. EACH SENSOR HEAD CAN BE MECHANICALLY FLIPPED ABOUT THE BOOM AXIS. OUTBOUND SENSORS ARE MOUNTED FOR LOW FIELD READINGS OF 1.E-12 TO 5.12E-7 TESLAS (1 MILLIGAMMA TO 512 GAMMAS), INBOUND SENSORS FOR HIGH FIELD READINGS OF 3.1E-11 TO 1.6E-5 TESLAS (31 MILLIGAMMAS TO 16 KILOGAMMAS). ELECTRONICS ARE MOUNTED ON THE SPINNING SECTION AND INCLUDE OPTIMUM AVERAGING CAPABILITY. THE MASS, EXCLUDING THE BOOM, IS 3.2 KG (1.0 FOR THE SENSORS, 2.2 FOR THE ELECTRONICS). THE TOTAL POWER IS 3.7 W.

----- GALILEO ORBITER, LACIS-----

INVESTIGATION NAME- PHOTOPOLARIMETER RADIOMETER

NSSDC ID- JOPO -08

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL
 PI - A.A. LACIS NASA-GISS
 OI - D.L. COFFERN NASA-GISS
 OI - J.E. HANSEN NASA-GISS
 OI - P.H. STONE MACS INST OF TECH
 OI - L. TRAVIS NASA-GISS
 OI - M.-C. WANG NASA-GISS
 OI - Y.L. YUNG CALIF INST OF TECH

BRIEF DESCRIPTION
 THE PURPOSES OF THE PHOTOPOLARIMETER RADIOMETER (PPR) INVESTIGATION ARE TO DETERMINE THE CLOUD AND HAZE PROPERTIES (VERTICAL AND HORIZONTAL DISTRIBUTION AND MICROSTRUCTURE) AND RADIATION BUDGET (INCLUDING VERTICAL PROFILE OF SOLAR HEATING) OF JUPITER AND TO INVESTIGATE THE PHOTOMETRIC AND THERMAL PROPERTIES OF SATELLITE SURFACES. THE INSTRUMENT IS A 10-CM DALL-KIRKHAM TELESCOPE FOLLOWED BY A 16-POSITION FILTER WHEEL, GIVING POLARIMETRY IN THREE SPECTRAL BANDS FROM 410 TO 1050 NANOMETERS AND PHOTOMETRY IN SEVEN SPECTRAL BANDS FROM 560 TO 890 NANOMETERS. SILICON PHOTODIODES ARE USED FOR PHOTOPOLARIMETRY AND A THERMOPILE DETECTOR FOR RADIOMETRY. MEASUREMENT ACCURACY IS 0.1 PERCENT ABSOLUTE POLARIMETRY; 1 PERCENT RELATIVE PHOTOMETRY AND 3 PERCENT ABSOLUTE PHOTOMETRY; 1 PERCENT RELATIVE RADIOMETRY AND 5 PERCENT ABSOLUTE RADIOMETRY. THE INSTRUMENT IS MOUNTED ON THE ORBITER SCAN PLATFORM. THE TOTAL MASS IS 3.6 KG AND THE TOTAL POWER IS 7.5 W.

----- GALILEO ORBITER, MASURSKY-----

INVESTIGATION NAME- GEOLOGY OF THE GALILEAN SATELLITES

NSSDC ID- JOPO -15 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY

PERSONNEL
 PI - M. MASURSKY US GEOLOGICAL SURVEY

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS INVESTIGATION IS TO USE ORBITER IMAGING AND NIMS DATA TO INVESTIGATE GEOLOGICAL PROCESSES ON THE GALILEAN SATELLITES, WITH EMPHASIS ON THE IDENTIFICATION AND DISTRIBUTION OF SURFACE MATERIALS, THE MORPHOLOGIES AND DENSITIES OF IMPACT CRATERS, AND THE SEARCH FOR STRUCTURE INDICATIVE OF GLACIAL AND PERIGLACIAL PROCESSES.

----- GALILEO ORBITER, MCELROY-----

INVESTIGATION NAME- INVESTIGATION OF THE JOVIAN UPPER ATMOSPHERE AND OF SATELLITE ATMOSPHERES

NSSDC ID- JOPO -16 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - M.B. MCELROY HARVARD U

BRIEF DESCRIPTION
 THIS INVESTIGATION USES DATA FROM A VARIETY OF PROBE AND ORBITER INVESTIGATIONS TO STUDY THE COMPOSITION AND STRUCTURE OF PLANETARY AND SATELLITE ATMOSPHERES, WITH EMPHASIS ON PHOTOCHEMISTRY AND INTERACTION OF THE ATMOSPHERES WITH THE MAGNETOSPHERE.

----- GALILEO ORBITER, ORTON-----

INVESTIGATION NAME- GROUND-TRUTH ANALYSIS OF RADIATIVE TRANSFER IN THE ATMOSPHERE OF JUPITER

NSSDC ID- JOPO -17 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - G.S. ORTON NASA-JPL

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE STRUCTURE OF THE ATMOSPHERE OF JUPITER USING DATA FROM THE PROBE STRUCTURE, COMPOSITION, NEPHELOMETRY, AND NET-FLUX RADIOMETER INVESTIGATIONS, TOGETHER WITH ORBITER PHOTOPOLARIMETER/RADIOMETER AND NIMS REMOTE-SENSING DATA. RESULTS INCLUDE AN ANALYSIS OF RADIATIVE EQUILIBRIUM IN THE UPPER TROPOSPHERE AND STRATOSPHERE AND AN ASSESSMENT OF THE INFORMATION REQUIRED IN GENERAL FOR SUCCESSFUL REMOTE DETERMINATION OF ATMOSPHERIC CONDITIONS ON THE OUTER PLANETS.

----- GALILEO ORBITER, OWEN-----

INVESTIGATION NAME- COMPOSITION OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -18 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - T. OWEN STATE U OF NEW YORK

BRIEF DESCRIPTION
 THIS INVESTIGATION USES DATA FROM THE MASS SPECTROMETER AND HELIUM INTERFEROMETER INVESTIGATIONS AND THE NIMS AND OTHER ORBITER INVESTIGATIONS TO ESTABLISH A DIRECT CALIBRATION OF PREVIOUS REMOTE MEASUREMENTS OF THE COMPOSITION OF JUPITER BY VOYAGER IRIS AND EARTH-BASED SPECTROSCOPIC OBSERVATIONS.

----- GALILEO ORBITER, POLLACK-----

INVESTIGATION NAME- THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -19 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - J.D. POLLACK NASA-ARC

BRIEF DESCRIPTION
 THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE VERTICAL TEMPERATURE STRUCTURE AND DYNAMICS OF THE JOVIAN ATMOSPHERE USING DATA FROM ALL OF THE PROBE INVESTIGATIONS TO CHARACTERIZE THE ROLES OF RADIATIVE HEATING, THERMAL CONVECTION, LATENT HEAT RELEASE, AND INTERNAL ENERGY SOURCES.

----- GALILEO ORBITER, RUSSELL-----

INVESTIGATION NAME- JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS

NSSDC ID- JOPO -20 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS
 INTERPLANETARY PHYSICS

PERSONNEL
 PI - C.T. RUSSELL U OF CALIF, LA

BRIEF DESCRIPTION
 THIS INVESTIGATION USES DATA FROM THE ORBITER MAGNETOMETER, PLASMA, PLASMA WAVE, AND ENERGETIC PARTICLE INVESTIGATIONS (1) TO STUDY THE JOVIAN MAGNETOSPHERE AND SATELLITE-MAGNETOSPHERE INTERACTIONS (WITH EMPHASIS ON REFINING MODELS OF THE JOVIAN MAIN FIELD); (2) TO STUDY THE INTERNAL STRUCTURE OF THE GALILEAN SATELLITES FROM THEIR INTERACTIONS WITH THE AMBIENT MEDIUM; (3) TO INVESTIGATE THE DYNAMICS OF THE MAGNETOSPHERE; AND (4) TO EXAMINE CRITICALLY THE OBSERVATIONAL DATA PERTAINING TO ENERGETIC PARTICLE TRANSPORT, ACCELERATION, AND LOSS IN THE JOVIAN MAGNETOSPHERE.

----- GALILEO ORBITER, SAGAN-----

INVESTIGATION NAME- ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -21 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - C. SAGAN CORNELL U

BRIEF DESCRIPTION
 THIS INVESTIGATION USES DATA FROM THE ORBITER NIMS AND UVS INVESTIGATIONS, TOGETHER WITH THE PROBE COMPOSITION AND NEPHELOMETER INVESTIGATIONS, TO STUDY THE ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE, WITH EMPHASIS ON THE NATURE OF THE ORGANIC AND INORGANIC CHROMOPHORES THAT PRODUCE THE COLORS OF THE JOVIAN CLOUDS.

----- GALILEO ORBITER, SCARF-----

INVESTIGATION NAME- WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER

NSSDC ID- JOPO -22 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
PI - F.L. SCARF

TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS INVESTIGATION USES MAGNETOSPHERIC DATA FROM THE ORBITER PLASMA, PLASMA WAVE, AND ENERGETIC PARTICLE INVESTIGATIONS TO STUDY WAVE-PARTICLE INTERACTION PHENOMENA, WITH EMPHASIS ON EVALUATING THE EFFECTIVE TRANSPORT COEFFICIENTS (ANOMALOUS CONDUCTIVITY, PITCH-ANGLE DIFFUSION COEFFICIENT, ETC.) ASSOCIATED WITH THE MAGNETOSPHERIC PLASMA INSTABILITIES AND SATELLITE-MAGNETOSPHERE INTERACTIONS.

----- GALILEO ORBITER, SCHUBERT-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION

NSSDC ID- JOPO -23

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - G. SCHUBERT

U OF CALIF, LA

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER IMAGING INVESTIGATION AND FROM ALL OF THE PROBE INVESTIGATIONS TO STUDY THE THERMAL AND DYNAMICAL PROCESSES RESPONSIBLE FOR THE GLOBAL ATMOSPHERIC CIRCULATION OF JUPITER AND THE WAYS THAT THESE PROCESSES ARE INFLUENCED BY THE STRUCTURE OF THE CLOUD LAYERS.

----- GALILEO ORBITER, SONETT-----

INVESTIGATION NAME- INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES+JOVIAN MAGNETOSPHERE

NSSDC ID- JOPO -24

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
INTERPLANETARY PHYSICS

PERSONNEL

PI - C.P. SONETT

U OF ARIZONA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO USE DATA FROM THE ORBITER MAGNETOMETER, PLASMA, AND PLASMA WAVE INVESTIGATIONS TO MEASURE ANY INTRINSIC MAGNETIC FIELDS THAT MAY EXIST ON THE GALILEAN SATELLITES AND TO INVESTIGATE THE PROCESSES WHEREBY THESE SATELLITES INTERACT WITH THE MAGNETOSPHERE AND MAIN FIELD OF JUPITER, INCLUDING COMPARISONS TO SIMILAR INTERACTIONS INVOLVING THE MOON.

----- GALILEO ORBITER, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- JOPO -06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - T.P. ARMSTRONG
OI - T.A. FRITZ
OI - S.M. KRIMIGIS
OI - L.J. LANZEROTTI
OI - R.W. MCENTIRE
OI - J.G. ROEDERER
OI - E.C. ROELOF
OI - W. STUCEMANN
OI - B. WILKIN

NOAA-ERL
U OF KANSAS
NOAA-ERL
APPLIED PHYSICS LAB
BELL TELEPHONE LAB
APPLIED PHYSICS LAB
U OF ALASKA
APPLIED PHYSICS LAB
MPI-AERONOMY
MPI-AERONOMY

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE (1) TO STUDY THE DETAILED ENERGY AND ANGULAR DISTRIBUTION AND STABILITY OF TRAPPED PROTONS, ELECTRONS, AND IONS AND DETERMINE ION COMPOSITION; (2) TO INVESTIGATE THE INTERACTIONS OF THESE PARTICLES WITH THE SATELLITES AND THE SOLAR WIND; (3) TO MEASURE THERMAL PLASMA FLOW VELOCITIES AND TEMPERATURES; AND (4) TO INVESTIGATE ADIABATIC AND NONTHERMAL PROCESSES IN THE TRAPPED RADIATION. THE INSTRUMENT PACKAGE CONSISTS OF A LOW-ENERGY MAGNETOSPHERIC MEASUREMENT SYSTEM (LEMMS), A COMPOSITION MEASUREMENT SYSTEM (CMS), AND AN INSTRUMENT STEPPING PLATFORM. THE LEMMS ENERGY RANGE AND CHARGE RESPONSE (MAGNETIC DEFLECTION AND DE/DX, E TECHNIQUES) ARE, FOR ELECTRONS, 0.015 - 11 MEV, AND 0.02 - 55 MEV/NUCLEON FOR PROTONS AND IONS. THE CMS ENERGY RANGE AND CHARGE RESPONSE (DE/DX, E, TIME OF FLIGHT, AND PULSE HEIGHT ANALYSIS TECHNIQUES) MEASURES HE THROUGH FE WITH VARYING ENERGY RESPONSES IN THE 0.15 - 100 MEV/NUCLEON RANGE. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. THE TOTAL MASS IS 7.4 KG AND THE TOTAL POWER IS 7.4 W.

***** GALILEO PROBE*****

SPACECRAFT COMMON NAME- GALILEO PROBE

ALTERNATE NAMES- JUPITER ORBITER PROBE, JOP
GALILEO

NSSDC ID- JOP

LAUNCH DATE- 03/26/85

WEIGHT- 250. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- JUPITER PROBE

PERSONNEL

MG - D.R. MCCULLAR
SC - R.E. MURPHY
PM - J. CASANI
PM - J. SPERANS
PS - L. COLIN
PS - T.V. JOHNSON

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
NASA-ARC
NASA-ARC
NASA-JPL

BRIEF DESCRIPTION

THE PROBE IS A STAGED-VENTED SYSTEM COMPOSED OF A DECELERATION MODULE AND A DESCENT MODULE. THE PROBE AND THE ORBITER WILL BE LAUNCHED FROM THE SHUTTLE SEPARATELY WITH CENTAUR UPPER STAGES. ITS MASS AND DIAMETER ARE 250 KG AND 1.2 M, RESPECTIVELY. THE DECELERATION MODULE CONSISTS OF STRUCTURE AND HEAT SHIELDS. THE DESCENT MODULE CONTAINS THE SCIENCE INSTRUMENTS. PROBE ELECTRONICS AND POWER SOURCES ARE VENTED TO THE JOVIAN ATMOSPHERE. A PARACHUTE IS USED TO SEPARATE THE DESCENT MODULE FROM THE DECELERATION MODULE AND TO CONTROL THE PROBE DESCENT RATE. IT MAY BE JETTISONED NEAR THE TERMINATION OF THE MISSION (AT A PRESSURE OF 10 BARS) TO ALLOW A MORE RAPID DESCENT AT THE HIGHER PRESSURES AND TEMPERATURES. IN SITU SCIENCE MEASUREMENTS ARE MADE PRIOR TO AND DURING HIGH-SPEED ENTRY AND DESCENT. POWER IS SUPPLIED BY A BATTERY. DATA ARE TELEMETTERED TO THE ORBITER, WHICH IN TURN RELAYS THEM TO EARTH. THE IN SITU MEASUREMENTS GIVE INFORMATION ON THE PHYSICAL STRUCTURE, CHEMICAL COMPOSITION, LOCATION OF CLOUDS IN THE TROPOSPHERE, AND THE THERMAL BALANCE OF THE PLANET. DATA ARE STORED IN A MEMORY UNIT FOR THE PERIOD OF COMMUNICATION BLACKOUT DURING ENTRY, AND THEN TRANSMITTED TO THE ORBITER, INTERLEAVED WITH REAL-TIME DATA.

----- GALILEO PROBE, BOESE-----

INVESTIGATION NAME- NET FLUX RADIOMETER

NSSDC ID- JOP -04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.W. BOESE
OI - J.B. POLLACK
OI - P.M. SILVAGGIO

NASA-ARC
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE (1) TO MEASURE VERTICAL DISTRIBUTION OF NET FLUX OF SOLAR ENERGY AND PLANETARY EMISSION IN THE REGION OF THE ATMOSPHERE FROM 0.1 TO 10 BARS, (2) TO DETERMINE THE LOCATION OF CLOUD LAYERS, AND (3) TO OBTAIN EVIDENCE ON THE MIXING RATIOS OF SELECTED CONSTITUENTS AND THE OPACITY OF CLOUDS AND AEROSOLS IN THE INFRARED. A MULTICHANNEL RADIOMETER MEASURES FLUX IN ABOUT 30-DEG CONES ALTERNATELY CENTERED PLUS OR MINUS 45 DEG FROM THE PROBE HORIZONTAL. THE RADIOMETER HAS AN ON-BOARD CALIBRATION SYSTEM (2 BLACK BODIES), A MULTIDETECTOR ARRAY (WITH CHANNELS AT APPROXIMATELY 0.3 - 3.0, 0.3 - 2000, 20 - 30, 30 - 40, AND 40 - 60 MICROMETERS), AND AN ARRAY OF SIX PYROELECTRIC DETECTORS. THE RADIOMETER IS MOUNTED ON THE PROBE WITH EXTERNAL VIEWING AFTER SHIELD DEPLOYMENT. THE TOTAL MASS IS 2.3 KG AND THE TOTAL POWER IS 4.6 W.

----- GALILEO PROBE, LANZEROTTI-----

INVESTIGATION NAME- LIGHTNING

NSSDC ID- JOP -06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SPACE PLASMAS
PLANETARY MAGNETIC FIELD

PERSONNEL

PI - L.J. LANZEROTTI
OI - G. DENHILL
OI - F.O. GLEIM
OI - E.P. KRIDER
OI - K. RINNERT
OI - M. UMAN

BELL TELEPHONE LAB
BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U
U OF ARIZONA
MPI-AERONOMY
U OF FLORIDA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO VERIFY THE EXISTENCE OF LIGHTNING ON JUPITER AND MEASURE ITS BASIC PHYSICAL CHARACTERISTICS, AND (2) TO MEASURE RF NOISE LEVELS AND ONE MAGNETIC FIELD COMPONENT NEAR JUPITER. TWO INSTRUMENTS ARE USED FOR THIS INVESTIGATION: AN ELECTROMAGNETIC SENSOR AND AN OPTICAL SENSOR. THE ELECTROMAGNETIC SENSOR HAS A FERRITE-CORE ANTENNA WITH A PREAMPLIFIER AS AN RF SENSOR. THE FREQUENCY DOMAIN IS 3, 15, AND 100 KHZ NARROW-BAND. THE TIME DOMAIN IS 1 HZ TO 100 KHZ, AND THE RESOLUTION IS 16 S. THE OPTICAL SENSOR HAS A PHOTODIODE WITH FISHEYE LENS. THERE IS COINCIDENCE AND ANTICOINCIDENCE BETWEEN THE RF AND OPTICAL SENSORS. THE ELECTROMAGNETIC SENSOR IS MOUNTED UNDER THE PROBE AFTERBODY, WHILE THE OPTICAL SENSOR IS MOUNTED ON THE PROBE ENVELOPE, LOOKING OUT PERPENDICULARLY TO THE PROBE SPIN AXIS. THE TOTAL MASS IS 1.1 KG AND THE TOTAL CONTINUOUS POWER IS 1.0 W.

----- GALILEO PROBE, NIEMANN-----

INVESTIGATION NAME- MASS SPECTROMETER

NSSDC ID- JOP -03

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - M.R. NIEMANN	NASA-GSFC
O1 - S.K. ATREYA	U OF MICHIGAN
O1 - G.R. CARIGHAN	U OF MICHIGAN
O1 - T.W. DONAHUE	U OF MICHIGAN
O1 - R.E. HARTLE	NASA-GSFC
O1 - D.W. HUNTER	U OF ARIZONA
O1 - I. OWEN	STATE U OF NEW YORK
O1 - N.W. SPENCER	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE CHEMICAL AND ISOTOPIC COMPOSITION AND PHYSICAL STATE OF THE JOVIAN ATMOSPHERE, INCLUDING VERTICAL VARIATIONS FROM 0.1 TO 10 BARS OR GREATER. MIXING RATIOS ARE DETERMINED FOR NE TO ONE PERCENT ACCURACY AND FOR H₂O, CH₄, AND NH₃ TO FIVE PERCENT ACCURACY. THE ISOTOPIC RATIO OF NE20 TO NE22 IS MEASURED TO AN ACCURACY OF TWO PERCENT. ALL SPECIES WITH MASS NUMBERS 1-52, PLUS SELECTED SPECIES AT HIGHER MASS NUMBERS (INCLUDING KRYPTON AND XENON), ARE MEASURED. THE INSTRUMENT IS A QUADRUPOLE MASS SPECTROMETER WITH AN ELECTRON IMPACT ION SOURCE HAVING REDUNDANT ELECTRON BEAM GUNS OF VARIABLE KINETIC ENERGY AND A SECONDARY ELECTRON MULTIPLIER ION DETECTOR. THE DUAL-CHANNEL SAMPLE INLET SYSTEM INCLUDES AN ENRICHMENT SYSTEM FOR TRACE-GAS AND ISOTOPE DETERMINATION, A TANDER GETTER, AND A SPUTTER ION PUMP. THE MASS RANGE IS 1-52, 84, AND 131 U. THE DYNAMIC RANGE IS 1.E+8. OTHER SPECIES WITH MASSES GREATER THAN 52 CAN BE SOUGHT AT THE SACRIFICE OF INTEGRATION TIME BELOW 52 U. THE SCAN PERIOD IS 3 TO 60 S. THE INSTRUMENT IS MOUNTED ON THE PROBE WITH THE SAMPLE INLET PORT NEAR THE STAGNATION POINT WITH THE SAMPLE OUTLET PORT NEAR THE MINIMUM PRESSURE POINT. THE TOTAL MASS IS 7.1 KG AND THE TOTAL POWER IS 15 W.

----- GALILEO PROBE, RAGENT-----

INVESTIGATION NAME- NEPHELOMETER

NSSDC ID- JOP -05

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - B. RAGENT	NASA-ARC
O1 - J.E. BLAMONT	CNRS-SA
O1 - G.W. GRAMS	GEORGIA INST OF TECH
O1 - J.B. POLLACK	NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE VERTICAL EXTENT, STRUCTURE, AND MICROPHYSICAL CHARACTERISTICS (PARTICLE SIZE DISTRIBUTION, NUMBER DENSITY, AND PHYSICAL STRUCTURE) OF JUPITER'S CLOUDS OVER THE RANGE 0.1 TO 10 BARS. A SINGLE-WAVELENGTH, MULTIPLE-ANGLE (5) SCATTERING NEPHELOMETER, WITH A GALLIUM-ARSENIC LED (9800 A) SOURCE AND SOLID-STATE DETECTORS IS MOUNTED ON THE PROBE, WITH APPROPRIATE EXTERNAL VIEWING GEOMETRY. DEPLOYMENT TAKES PLACE AFTER THE HEAT SHIELD IS REMOVED. THE TOTAL MASS IS 1.8 KG AND THE TOTAL CONTINUOUS POWER IS 3.0 W.

----- GALILEO PROBE, SIEFF-----

INVESTIGATION NAME- ATMOSPHERIC STRUCTURE

NSSDC ID- JOP -02

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A. SIEFF	NASA-ARC
O1 - R.L. BLANCHARD	NASA-LARC
O1 - D.B. KIRK	NASA-ARC
O1 - G. SCHUBERT	U OF CALIF, LA
O1 - S.C. SOMMER	NASA-ARC
O1 - R.E. YOUNG	NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE TEMPERATURE, PRESSURE, DENSITY, AND MOLECULAR WEIGHT OVER AN ALTITUDE RANGE FROM A THRESHOLD OF ABOUT 1000 KM ABOVE THE CLOUD DECK DOWN TO PROBE FAILURE (DEEPER THAN 10-BAR PRESSURE). THE INSTRUMENT PACKAGE CONSISTS OF ACCELERATION, TEMPERATURE, AND PRESSURE SENSORS AND ASSOCIATED ELECTRONICS. THE PACKAGE IS MOUNTED IN THE PROBE WITH ACCELEROMETERS NEAR THE PROBE CENTER OF GRAVITY. THE TEMPERATURE-SENSING HEAD AND PRESSURE INLET ARE DEPLOYED OUTSIDE THE PROBE BOUNDARY LAYER. THE TOTAL MASS IS 1.9 KG AND THE TOTAL CONTINUOUS POWER IS 5.5 W.

----- GALILEO PROBE, VON ZAHN-----

INVESTIGATION NAME- HELIUM ABUNDANCE INTERFEROMETER

NSSDC ID- JOP -01

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - U. VON ZAHN	U OF BONN
O1 - M.-J. HOFFMAN	U OF BONN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS THE PRECISE (0.1 PERCENT) DETERMINATION OF THE HELIUM ABUNDANCE IN THE JOVIAN ATMOSPHERE FROM 3 TO 8 BARS. A TWO-ARM, DOUBLE-PATHLENGTH OPTICAL INTERFEROMETER THAT INCLUDES AN IR LIGHT-EMITTING DIODE (LED) LIGHT SOURCE, AN INTERFERENCE FILTER, AND A PHOTODETECTOR ARRAY, IS USED TO MEASURE THE REFRACTIVE INDEX DIFFERENCE BETWEEN AN ATMOSPHERIC SAMPLE AND A REFERENCE GAS MIXTURE. IT IS MOUNTED ON THE PROBE WITH AN INLET PIPE TO THE AMBIENT ATMOSPHERE. THE TOTAL MASS IS 1.0 KG AND THE TOTAL CONTINUOUS POWER IS 0.7 W.

***** GAMMA-RAY OBSERVATORY*****

SPACECRAFT COMMON NAME- GAMMA-RAY OBSERVATORY
ALTERNATE NAMES-

NSSDC ID- GRO

LAUNCH DATE- 01/01/84	WEIGHT- 10000. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES	
LAUNCH VEHICLE- SHUTTLE	

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	
ORBIT PERIOD- 92.5 MIN	INCLINATION- 28.5 DEG
PERIAPSIS- 400. KM ALT	APOAPSIS- 400. KM ALT

PERSONNEL

PG - D.R. BURROWBRIDGE	NASA HEADQUARTERS
SC - A.G. OPP	NASA HEADQUARTERS
PM - J.J. MADSEN	NASA-GSFC
PS - D.A. KNIFFEN	NASA-GSFC

BRIEF DESCRIPTION

THE GRO IS DESIGNED AS A FREE-FLYING SATELLITE LAUNCHED FROM THE SPACE SHUTTLE, CARRYING FIVE GAMMA-RAY INSTRUMENTS THAT REQUIRE SUSTAINED POINTING TOWARD GAMMA-RAY SOURCES IN SPACE. THE SPACECRAFT IS STABILIZED IN THREE AXES. GRO IS SUPPORTED BY A MECHANICAL STRUCTURE WHICH, IN ADDITION TO THE SCIENTIFIC INSTRUMENTS, HOUSES AN ATTITUDE-CONTROL SYSTEM, A POWER SYSTEM, AND A COMMAND AND COMMUNICATIONS SYSTEM. ALL THE MAIN SUBSYSTEMS ARE REDUNDANT FOR INCREASED RELIABILITY OF THE MISSION. THE PLANNED OPERATING LIFE IN ORBIT IS 2 YEARS. DATA ARE RETRIEVED THROUGH THE TDRSS. THE OBJECTIVE OF THE MISSION IS TO CONDUCT EXPLORATION OF THE GAMMA-RAY SPECTRUM ORIGINATING IN OUR GALAXY AND BEYOND. OBSERVATIONS SPAN THE ENERGY RANGE FROM 30 KEV TO 30 GEV WITH BETTER THAN 10 TIMES THE SENSITIVITY OF PREVIOUS MISSIONS. LOW-ENERGY STUDIES ATTEMPT TO DETERMINE THE ORIGIN OF GAMMA-RAY BURSTS. MEDIUM- AND HIGH-ENERGY STUDIES ADDRESS NUMEROUS ASTROPHYSICAL QUESTIONS.

----- GAMMA-RAY OBSERVATORY, FICHEL-----

INVESTIGATION NAME- HIGH-ENERGY GAMMA-RAY TELESCOPE

NSSDC ID- GRO -04

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY
ASTRONOMY
HIGH ENERGY ASTROPHYSICS

PERSONNEL
 PI - C.E. FICHTEL
 PI - R. HOFSTADTER
 PI - K. PINKAU
 OI - D.L. BERTSCH
 OI - A.J. FAVALE
 OI - R.C. MARTIN
 OI - E.R. HUGHES
 OI - D.A. KIFFEN
 OI - M.A. MAYER-HASSELWANDER
 OI - H. ROTHERMEL
 OI - E.J. SCHNEID
 OI - M.K. SOMMER
 OI - D.B. THOMPSON

NASA-GSFC
 STANFORD U
 MPI-EXTRATERRE PHYS
 NASA-GSFC
 GRUMMAN AEROSPACE CORP
 NASA-GSFC
 STANFORD U
 NASA-GSFC
 MPI-EXTRATERRE PHYS
 MPI-EXTRATERRE PHYS
 GRUMMAN AEROSPACE CORP
 MPI-EXTRATERRE PHYS
 NASA-GSFC

BRIEF DESCRIPTION

THE INSTRUMENT IS A PICTORIAL-TYPE TELESCOPE USING A DIGITIZED SPARK CHAMBER TO IDENTIFY THE ELECTRON PAIR PRODUCED BY A GAMMA-RAY INTERACTION, AND A LARGE NAI (TL) SCINTILLATOR CRYSTAL TO DETERMINE THE GAMMA-RAY ENERGY. THE SPECIFIC OBJECTIVES OF THE EXPERIMENT ARE (1) TO SEARCH FOR LOCALIZED SOURCES (E.G., NEUTRON STARS, BLACK HOLES) IN THE 20 MEV-30 GEV RANGE AND STUDY THEIR PROPERTIES, (2) TO IMPROVE LOCATION ACCURACY OF KNOWN SOURCES, (3) TO SEARCH FOR EVIDENCE OF COSMIC-RAY PARTICLE ACCELERATION IN SUPERNOVA REMNANTS, (4) TO STUDY GAMMA-RAY BURSTS AND LINE EMISSION FROM SOLAR FLARES, (5) TO OBTAIN A DETAILED PICTURE OF THE DIFFUSE GAMMA-RAY EMISSION FROM OUR GALAXY, AND STUDY GALACTIC DYNAMICS, COSMIC-RAY COMPOSITION, AND MAGNETIC FIELDS, (6) TO STUDY OTHER GALAXIES, BOTH NORMAL AND PECULIAR, AND (7) TO STUDY THE DIFFUSE CELESTIAL RADIATION AS IT RELATES TO COSMOLOGY.

----- GAMMA-RAY OBSERVATORY, FISMAN-----

INVESTIGATION NAME- TRANSIENT-EVENT MONITOR

NSSDC ID- GRO -05 INVESTIGATIVE PROGRAM
 CODE SC

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY
 ASTRONOMY
 HIGH ENERGY ASTROPHYSICS

PERSONNEL
 PI - G.J. FISMAN
 OI - C.A. MEEGAN
 OI - T.A. PARNELL

NASA-MSFC
 NASA-MSFC
 NASA-MSFC

BRIEF DESCRIPTION

THE SIX-DETECTOR ARRAY OF THE TRANSIENT-EVENT MONITOR PROVIDES DEFINITIVE DATA ON (1) THE DISTRIBUTION OF BURST SIZES (LOG N - LOG S CURVE) DOWN TO 6.0E-15 J/50 CM, (2) THE PRECISE DIRECTION OF MANY SOURCES THROUGH INTERPLANETARY TIMING, (3) THE GENERAL LOCATION OF NUMEROUS ADDITIONAL BURST SOURCES, AND (4) FLUCTUATIONS AND SPECTRAL CHANGES ON TIME SCALES OF 1 MS OR LESS. THESE DATA NOT ONLY CONSTRAIN THEORIES OF BURST SOURCES AND THEIR EMISSION MECHANISM, BUT MAY PROVIDE IDENTIFICATIONS WITH OPTICAL OR X-RAY OBJECTS. THE EXPERIMENT ALSO PROVIDES GRO WITH A MONITOR OF THE ENTIRE UNOCCUPIED SKY FOR TRANSIENT EVENTS AND BURSTS. THE EXPERIMENT PACKAGE CONSISTS OF 12 48-CM-DIAMETER, 1.27-CM THICK NAI (TL) DISCS WITH ANTI-COINCIDENCE SHIELDS. THE ENERGY RANGE IS 60 TO 600 KEV IN APPROXIMATELY SIX CHANNELS; THE TIME RESOLUTION IS 0.1 MICROSECONDS. THE WEIGHT OF THE PACKAGE IS 500 KG; IT USES 32 W AND HAS A DATA RATE OF 0.8 KBPS.

----- GAMMA-RAY OBSERVATORY, KURFESS-----

INVESTIGATION NAME- SCINTILLATION SPECTROMETER

NSSDC ID- GRO -02 INVESTIGATIVE PROGRAM
 CODE SC

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY
 ASTRONOMY
 HIGH ENERGY ASTROPHYSICS

PERSONNEL
 PI - J.D. KURFESS
 OI - M. ULMER
 OI - M.N. JOHNSON
 OI - R.L. KINZER
 OI - G.H. SHARE
 OI - C. DYER
 OI - D.D. CLAYTON

US NAVAL RESEARCH LAB
 NORTHWESTERN U
 US NAVAL RESEARCH LAB
 US NAVAL RESEARCH LAB
 US NAVAL RESEARCH LAB
 ROYAL NAVAL COLLEGE
 RICE U

BRIEF DESCRIPTION

THE INSTRUMENT IS COMPOSED OF FOUR IDENTICAL HIGH-SENSITIVITY SCINTILLATION DETECTORS THAT ARE INDEPENDENTLY MOUNTED ON ONE-AXIS ORIENTATION SYSTEMS. FOR MOST OBSERVATIONS, TWO DETECTORS ARE POINTED AT THE SOURCE, WHILE THE OTHER TWO ARE OFFSET BY 15 DEG FOR SIMULTANEOUS BACKGROUND MEASUREMENTS. FOR TIME-VARIABLE PHENOMENA, ALL FOUR DETECTORS CAN BE POINTED AT THE SOURCE FOR MAXIMUM SENSITIVITY. OF PARTICULAR INTEREST ARE OBSERVATIONS OF NUCLEAR LINE RADIATION FROM SUPERNOVAE, NOVAE, NEUTRON STARS, ACCRETION ONTO BLACK HOLES, SOLAR FLARES, AND CONTINUUM RADIATION. THE DETECTORS ARE OPTIMIZED IN THE 0.1 - 10 MEV RANGE BUT HAVE ADDITIONAL CAPABILITY FOR MEASUREMENTS FROM 10 - 150 MEV. THE FOV IS 9 DEG WITH AN EFFECTIVE AREA OF 1507 CM SQ AT .51 MEV. THE TIME RESOLUTION IS 8 S IN NORMAL MODE AND 4 MICROSECONDS IN BURST MODE. ALL DETECTORS CAN BE SOLAR PAINTED FOR FLARE

OBSERVATIONS WITHOUT AFFECTING THE OTHER INSTRUMENTS ON THE SPACECRAFT. THE INSTRUMENT WEIGHS 1402 KG; IT USES 60 W AND HAS A DATA RATE OF 4 KBPS.

----- GAMMA-RAY OBSERVATORY, SCHONFELDER-----

INVESTIGATION NAME- IMAGING COMPTON TELESCOPE

NSSDC ID- GRO -03 INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY
 ASTRONOMY
 HIGH ENERGY ASTROPHYSICS

PERSONNEL
 PI - V. SCHONFELDER
 OI - B.N. SWANENBURG
 OI - J.A. LOCKWOOD
 OI - B.G. TAYLOR
 OI - G. KANDACH
 OI - F. MELTZER
 OI - J.A.M. BLEEKER
 OI - A.J.M. DEERENDERS
 OI - W. NERSEN
 OI - M.R. WEBBER
 OI - K. BENNETT
 OI - R.D. WILLS

MPI-EXTRATERRE PHYS
 U OF LEIDEN
 U OF NEW HAMPSHIRE
 ESA-ESTEC
 MPI-EXTRATERRE PHYS
 MPI-EXTRATERRE PHYS
 U OF LEIDEN
 U OF LEIDEN
 U OF LEIDEN
 U OF NEW HAMPSHIRE
 ESA-ESTEC
 ESA-ESTEC

BRIEF DESCRIPTION

THE INVESTIGATION EMPLOYS AN IMAGING COMPTON TELESCOPE THAT COVERS THE 1- TO 30-MEV ENERGY RANGE. THIS INSTRUMENT IS ABLE TO OVERCOME BACKGROUND PROBLEMS AND PROVIDE UNPRECEDENTED SENSITIVITY AND SPATIAL RESOLUTION. THE SCIENTIFIC OBJECTIVES OF THIS EXPERIMENT ARE (1) STUDY OF INTENSITIES, SPECTRA, AND SPATIAL DISTRIBUTION OF LOCALIZED SOURCES TO AN INTENSITY ABOUT 1/50 OF THE CRAB NEBULA, (2) STUDY OF THE DIFFUSE GALACTIC EMISSION IN THE ENERGY RANGE WHERE ELECTROMAGNETIC PROCESSES ARE EXPECTED TO DOMINATE, (3) STUDY OF THE DIFFUSE COSMIC INTENSITY, AND (4) STUDY OF BROADENED LINE EMISSION FROM EXCITED NUCLEI IN THE DIFFUSE GALACTIC EMISSION AND FROM LOCALIZED SOURCES, INCLUDING THE SUN, USING THE 1-50-M NAI DETECTORS WITH AN ENERGY RESOLUTION OF ABOUT 10 PERCENT FWHM AND AN ANGULAR RESOLUTION OF 2 - 6 DEG (FWHM). THE INSTRUMENT WEIGHT IS 1350 KG; IT USES 100 W AND HAS A DATA RATE OF 4.5 KBPS.

***** GIOTTO*****

SPACECRAFT COMMON NAME- GIOTTO
 ALTERNATE NAMES-

NSSDC ID- GIOTTO

LAUNCH DATE- 07/15/85 WEIGHT- 750. KG
 LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
 LAUNCH VEHICLE- ARIN 2/SYL

SPONSORING COUNTRY/AGENCY
 INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- HELIOCENTRIC
 ORBIT PERIOD- DAYS
 PERIAPSIS- AU RAD INCLINATION- DEG
 APOAPSIS- AU RAD

PERSONNEL
 PI - D. DALE
 PS - R. REINHARD

ESA-ESTEC
 ESA-ESTEC

BRIEF DESCRIPTION

THIS MISSION IS DESIGNED TO ENCOUNTER HALLEY'S COMET ON MARCH 13, 1986 AT A DISTANCE OF 0.89 AU FROM THE SUN AND 0.98 AU FROM THE EARTH AT AN ANGLE OF 107 DEG FROM THE COMET-SUN LINE. THE S/C IS BASED AS MUCH AS POSSIBLE ON THE ESA-GEOS S/C AND IS SPIN STABILIZED. DURING THE HALLEY ENCOUNTER, THE SPIN AXIS IS ALIGNED WITH THE RELATIVE VECTOR VELOCITY. THE 1.5-M DISH ANTENNA, OPERATING AT X-BAND, IS INCLINED AND RESPUN SO AS TO POINT AT THE EARTH (44 DEG WITH RESPECT TO THE VELOCITY VECTOR). THE SCIENTIFIC PAYLOAD OF 10 EXPERIMENTS WEIGHS 54.4 KG. A CAMERA PRODUCES COLOR PHOTOGRAPHS OF THE NUCLEUS. OTHER OBJECTIVES OF THE MISSION ARE (1) TO DETERMINE THE ELEMENTAL AND ISOTOPIC COMPOSITION OF VOLATILE COMPONENTS IN THE COMETARY COMA, PARTICULARLY PARENT MOLECULES; (2) TO CHARACTERIZE THE PHYSICAL AND CHEMICAL PROCESSES THAT OCCUR IN THE COMETARY ATMOSPHERE AND IONOSPHERE; (3) TO DETERMINE THE ELEMENTAL AND ISOTOPIC COMPOSITION OF DUST PARTICLES; (4) TO MEASURE TOTAL GAS-PRODUCTION RATE AND DUST FLUX AND SIZE/MASS DISTRIBUTION; AND TO DERIVE DUST-TO-GAS RATIO; AND (5) TO INVESTIGATE THE MACROSCOPIC SYSTEMS OF PLASMA FLOWS RESULTING FROM THE COMETARY-SOLAR WIND INTERACTION. THE GOAL IS TO COME WITHIN 500 KM OF HALLEY AT CLOSEST ENCOUNTER. THE S/C HAS A DUST SHIELD CONSISTING OF A FRONT SHEET OF AL 1 MM THICK AND A 12-MM KELVAR NEAR SHEET SEPARATED BY 25 CM, WHICH SHOULD WITHSTAND IMPACTS OF PARTICLES UP TO 0.1 G. THE EXPERIMENTS ARE SWITCHED ON 3 H 45 MIN BEFORE CLOSEST APPROACH. DURING THE CRUISE MODE, THE S/C IS CONTROLLED BY ESOC USING THE 30-M ANTENNA AT WEILHEIM. FOR THE 4-M ENCOUNTER, THE 64-M ANTENNA AT PARKES, AUSTRALIA IS EMPLOYED.

----- GIOTTO, BALSIGER-----

INVESTIGATION NAME- ION MASS SPECTROMETER (IMS)

NSSDC ID- GIOTTO -03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PARTICLES AND FIELDS

PERSONNEL

PI - H. BALSIGER
OI - UNKNOWN
OI - UNKNOWN

U OF BERNE
NASA-JPL
LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, JOHNSTONE-----

INVESTIGATION NAME- FAST IMPLANTED ION SENSOR (FJA)

NSSDC ID- GIOTTO -05

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PARTICLES AND FIELDS

PERSONNEL

PI - A.D. JOHNSTONE
OI - UNKNOWN
OI - UNKNOWN

MULLARD SPACE SCI LAB
CNR, SPACE PLASMA LAB
MPI-AERONOMY

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, KELLER-----

INVESTIGATION NAME- HALLEY NUCLEUS IMAGING (HNC)

NSSDC ID- GIOTTO -01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
INTERPLANETARY PHYSICS

PERSONNEL

PI - H.U. KELLER
OI - UNKNOWN
OI - UNKNOWN
OI - UNKNOWN
OI - UNKNOWN
OI - UNKNOWN

MPI-AERONOMY
CNRS-LPSP
DFVLR
BALL AEROSPACE SYS DIV
INST D'ASTROPHYSIQUE
INST DI ASTRONOMIA

BRIEF DESCRIPTION

THIS INVESTIGATION USES A CAMERA THAT TAKES COLOR PHOTOGRAPHS OF THE SURFACE OF THE COMET NUCLEUS WITH A RESOLUTION OF 50 M AT A DISTANCE OF 1,000 KM. FURTHER DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, KISSEL-----

INVESTIGATION NAME- DUST IMPACT MASS SPECTROMETER (PIA)

NSSDC ID- GIOTTO -04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
DUST

PERSONNEL

PI - J. KISSEL

MPI-NUCLEAR PHYS

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, KRANKOWSKY-----

INVESTIGATION NAME- NEUTRAL MASS SPECTROMETER (NMS)

NSSDC ID- GIOTTO -02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - D. KRANKOWSKY
OI - UNKNOWN
OI - UNKNOWN
OI - UNKNOWN
OI - UNKNOWN

MPI-NUCLEAR PHYS
U OF TEXAS, DALLAS
U OF BONN
U OF BERNE
CNRS-LGE

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, LEVASSEUR-REGOURD-----

INVESTIGATION NAME- HALLEY OPTICAL PROBE (HOPE)

NSSDC ID- GIOTTO -09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS

PERSONNEL

PI - A.C. LEVASSEUR-REGOURD
OI - UNKNOWN
OI - UNKNOWN

CNRS
U OF FLORIDA
CNRS-LAS

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, McDONNELL-----

INVESTIGATION NAME- DUST IMPACT DETECTOR (DID)

NSSDC ID- GIOTTO -08

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
DUST

PERSONNEL

PI - J.A.M. McDONNELL
OI - UNKNOWN

U OF KENT
MPI-NUCLEAR PHYS

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, MCKENNA-LAWLOR-----

INVESTIGATION NAME- ENERGETIC PARTICLES (EPA)

NSSDC ID- GIOTTO -10

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M.P. MCKENNA-LAWLOR
OI - UNKNOWN
OI - UNKNOWN

ST PATRICK'S COLLEGE
MPI-AERONOMY
DUBLIN INST ADV STUDY

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, NEUBAUER-----

INVESTIGATION NAME- MAGNETOMETER (MAG)

NSSDC ID- GIOTTO -07

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - UNKNOWN
OI - UNKNOWN

BRAUNSCHWEIG TECH U
NASA-GSFC
U OF ROME

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

----- GIOTTO, REME-----

INVESTIGATION NAME- ELECTRON ESA AND POSITIVE ION CLUSTER COMPOSITION ANALYZER (EPA)

NSSDC ID- GIOTTO -86

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PARTICLES AND FIELDS

PERSONNEL

PI - M. RERE CESR
OI - UNKNOWN MPI-AERONOMY
OI - UNKNOWN U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS INVESTIGATION HAS JUST BEEN APPROVED AND DETAILS OF THE INSTRUMENTATION HAVE BEEN SOLICITED FROM THE PRINCIPAL INVESTIGATOR.

***** GOES-F*****

SPACECRAFT COMMON NAME- GOES-F
ALTERNATE NAMES-

NSSDC ID- GOES-F

LAUNCH DATE- 12/02/82 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NES
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 1. DEG
PERIAPSIS- 35786. KM ALT APOAPSIS- 35786. KM ALT

PERSONNEL

MG - A.J. CIVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES-F IS THE SIXTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO REGIONAL STATIONS EQUIPPED WITH SMALL AUTOMATIC PICTURE TRANSMISSION (APT) AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 63 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORM THE OUTER WALL OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

***** GOES-F, NESA STAFF*****

INVESTIGATION NAME- VISIBLE INFRARED SPIN-SCAN RADIOMETER
ATMOSPHERIC SOUNDER (VAS)

NSSDC ID- GOES-F -01

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESA STAFF NOAA-NES
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) OPERATES IN THREE DISTINCT MODES TO PROVIDE PARAMETER FLEXIBILITY, SPECTRAL BAND SELECTION, GEOGRAPHIC LOCATION, AND SIGNAL-TO-NOISE RATIO. THE VISSR MODE IS THE SAME AS THE VISSR SYSTEM ON BOARD GOES 1, 2, 3. BOTH THE IR CHANNEL (10.5 TO 12.5 MICROMETERS) AND VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USE COMMON OPTICS. INCOMING RADIATION IS COLLECTED BY A RITCHIEY-CRETJEN OPTICAL SYSTEM. THE SPINNING MOTION OF THE SPACECRAFT (100 RPM) PROVIDES A WEST TO EAST (W

TO E) SCAN MOTION. SCAN MISSION TILT AFTER EACH SPIN PROVIDES A NORTH TO SOUTH (N TO S) SCAN MOTION. A FULL PICTURE TAKES 10.2 MIN TO COMPLETE AND 2 MIN TO RESET FOR NEXT IMAGE. EIGHT VISIBLE-SPECTRUM DETECTORS (0.9 KM HORIZONTAL RESOLUTION) AND ONE MERCURY-CADMIUM TELLURIDE IR DETECTOR (6.9 HORIZONTAL RESOLUTION) SWEEP THE EARTH DURING EACH SCAN. THE DWELL-SOUNDING MODE USES UP TO 12 SPECTRAL FILTERS IN A WHEEL COVERING THE RANGE 670.7 PER CM (14.74 MICROMETERS) THROUGH 2535 PER CM (3.94 MICROMETERS) POSITIONED INTO THE OPTICAL TRAIN WHILE THE SCANNER IS DWELLING ON A SINGLE N TO S SCAN LINE. THE FILTER WHEEL CAN BE PROGRAMMED SO THAT EACH SPECTRAL BAND FILTER CAN DWELL ON A SINGLE SCAN LINE FOR FROM 8 TO 200 SPACECRAFT SPINS. EITHER THE 6.9-KM OR 13.8-KM-RESOLUTION DETECTORS CAN BE SELECTED FOR THE SEVEN FILTER POSITIONS OPERATING IN THE SPECTRAL REGION 701.6 PER CM (14.25 MICROMETERS) THROUGH 1407 PER CM (6.725 MICROMETERS). FOR THE REMAINING FIVE SPECTRAL BANDS, THE 13.8-KM-RESOLUTION DETECTORS ARE USED. SELECTABLE FRAME SIZE, POSITION AND SCAN DIRECTION ARE ALSO PROGRAMMABLE VIA GROUND COMMAND. FOR THE VAS DEMONSTRATION, 10-BIT REDUCED RESOLUTION (3.5 KM) VISIBLE DATA IS PROVIDED FOR IMAGING. IN SOME OF THE SPECTRAL REGIONS, MULTIPLE-LINE DATA ARE REQUIRED TO ENHANCE THE SIGNAL-TO-NOISE (S/N) RATIO. TYPICALLY, 167 SATELLITE SPINS AT THE SAME N TO S SCAN LINE POSITION ARE REQUIRED TO OBTAIN THE DESIRED SOUNDING DATA. THIS NUMBER OF SPINS PER LINE SHOULD BE ADEQUATE TO OBTAIN SOUNDINGS HAVING A 30- X 30-KM RESOLUTION AND REQUIRE APPROXIMATELY 1.9 MINUTES ON THE AVERAGE. THE MULTISPECTRAL IMAGING (MSI) MODE CAN PROVIDE NORMAL VISSR IMAGING PLUS DATA IN ANY TWO SELECTED SPECTRAL BANDS HAVING A SPATIAL RESOLUTION OF 13.8 KM. THIS MODE OF OPERATION TAKES ADVANTAGE OF THE SMALL MERCURY-CADMIUM TELLURIDE DETECTOR OFFSET IN THE N TO S PLANE. USING THE DATA FROM THESE DETECTORS SIMULTANEOUSLY PRODUCES A COMPLETE INFRARED MAP WHEN THEY ARE OPERATED EVERY OTHER SCAN LINE. THIS ALLOWS USING THE LARGER DETECTORS DURING HALF OF THE IMAGING/SCANNING SEQUENCE PERIOD TO OBTAIN ADDITIONAL SPECTRAL INFORMATION. UNLIMITED N TO S FRAME SIZE AND POSITION SELECTION, WITHIN THE MAXIMUM N TO S FOV SCAN DIRECTION, CAN BE SELECTED. VISIBLE DATA ARE NOT AVAILABLE IN THIS MODE SINCE THE VAS IS CONSTRAINED TO THE LOR SYSTEM. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. THE VISSR DATA ARE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING. SINCE WALLOPS ISLAND IS COMMITTED TO NOAA OPERATIONAL SUPPORT, DATA FROM THE VAS MSI MODE AND THE DWELL SOUNDING MODE ARE NOT 'STRETCHED'.

***** GOES-F, NESA STAFF*****

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND
TRANSMISSIONS SYSTEM

NSSDC ID- GOES-F -05

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESA STAFF NOAA-NES

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

***** GOES-F, WILLIAMS*****

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-F -02

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - M.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THE ENERGY PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 900 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND 67.400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .02-900 KEV RANGE.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-F-03

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORINGINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.F. DONNELLYNOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A, 1.0E-13 J PER 50 CM PER S AND 1 TO 8A, 1.0E-12 J PER 50 CM PER S WITH A DYNAMIC RANGE OF 1.24.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-F-04

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORINGINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - J.N. BARFIELDNOAA-ERL
SOUTHWEST RES INST

BRIEF DESCRIPTION

THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** HIPPARCOS*****

SPACECRAFT COMMON NAME- HIPPARCOS

ALTERNATE NAMES- SPACE ASTROMETRY

NSSDC ID- HIPPA

LAUNCH DATE- 12/09/85

WEIGHT- 836. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANESPONSORING COUNTRY/AGENCY
INTERNATIONAL

ESA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1436. MIN
PERIAPSIS- 39266. KM ALTINCLINATION- 3. DEG
APOAPSIS- 36304. KM ALT

PERSONNEL

PM - L. EMILIANI
PS - M.A.C. PERRYMANESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THE SPACECRAFT CONSISTS OF TWO PLATFORMS AND FOUR VERTICAL PANELS, ALL MADE OF ALUMINUM. THE SOLAR ARRAY CONSISTS OF A LARGE ARRAY ON TOP OF THE UPPER PLATFORM AND TWO SMALLER DEPLOYABLE SECTIONS. FIXED ANTENNAE ARE LOCATED ON THE TOP AND BOTTOM OF THE SPACECRAFT. AN ALTITUDE AND ORBIT-CONTROL SUBSYSTEM ENSURES CORRECT DYNAMIC ATTITUDE CONTROL AND DETERMINATION DURING THE 2.5-YEAR PLANNED LIFETIME TO AN ACCURACY OF 10 ARC MIN. THE SPACECRAFT SPINS AROUND ITS Z AXIS AT THE RATE OF 10 REV/D AT AN ANGLE OF 36 DEG TO THE SUN. THE Z AXIS ROTATES ABOUT THE SUN-SATELLITE LINE AT 7.5 REV/Y. THE SCIENTIFIC GOALS ARE THE ACCURATE MEASUREMENT OF THE TRIGONOMETRIC PARALLAXES, PROPER MOTION, AND POSITIONS OF 1.05 SELECTED STARS, MOST WITH MAGNITUDES LESS THAN 10. THE SPACECRAFT CARRIES A SINGLE TELESCOPE WHICH SUPERIMPOSES IN THE FOCAL PLANE TWO FIELDS OF VIEW, 68.5 DEG APART. THE ATTITUDE OF THE SPACECRAFT ABOUT ITS CG IS CONTROLLED TO SCAN THE CELESTIAL SPHERE IN A REGULAR MOVEMENT. THE TELESCOPE USES A SYSTEM OF GRIDS AT THE FOCAL SURFACE COMPOSED OF ALTERNATELY OPAQUE AND TRANSPARENT BANDS. BEHIND THESE GRIDS, AN IMAGE-DISSECTOR TUBE CONVERTS THE MODULATED LIGHT INTO A SEQUENCE OF PHOTON COUNTS FROM WHICH THE PHASE OF THE ENTIRE PULSE TRAIN FROM A STAR CAN BE DERIVED. THE APPARENT ANGLE BETWEEN TWO STARS IN THE COMBINED FIELDS OF VIEW IS OBTAINED FROM THE PHASE DIFFERENCE OF THE TWO STAR PULSE TRAINS. THE OPTICAL DESIGN OF THE TELESCOPE IS BASED ON THE ALL-REFLECTIVE BAKER-SCHMIDT SYSTEM. A COMPLEX MIRROR, CONSISTING OF TWO MIRRORS TILTED IN OPPOSITE DIRECTIONS, EACH OCCUPYING HALF OF THE RECTANGULAR ENTRANCE PUPIL, IS EMPLOYED. THE UNVIGNETTED FIELD OF VIEW IS 94 ARC MIN BY 54 ARC MIN. THE MISSION IS A FACILITY TYPE IN WHICH GUEST INVESTIGATORS PROPOSE PARTICULAR

RESEARCH PROGRAMS AND SELECTED STARS ARE INCORPORATED INTO THE OVERALL OBSERVING STRATEGY.

***** INSAT-1A*****

SPACECRAFT COMMON NAME- INSAT-1A

ALTERNATE NAMES- INDIAN NATIONAL SAT.

NSSDC ID- INSAT-1

LAUNCH DATE- 02/10/82

WEIGHT- KG

LAUNCH SITE- SHRINAGIKOTA (ANDHRA PRADESH), INDIA

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

INDIA

ISRO

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN
PERIAPSIS- 36000. KM ALT

INCLINATION-

APOAPSIS- 36000. KM ALT

PERSONNEL

PM - UNKNOWN
PS - UNKNOWNUNKNOWN
UNKNOWN

BRIEF DESCRIPTION

THE INSAT-1 SATELLITE PROGRAM INCORPORATES TWO THREE-AXIS STABILIZED SPACECRAFT IN GEOSTATIONARY ORBIT (INSAT-1A AT 94 DEGREES E AND INSAT-1B AT 74 DEGREES E) WITH A HOST OF GROUND STATIONS THROUGHOUT INDIA. THE INSAT-1A SATELLITE, BUILT BY THE FORD AEROSPACE AND COMMUNICATIONS CORPORATION, PROVIDES A COMBINED TELECOMMUNICATIONS, DIRECT TV BROADCAST, AND METEOROLOGICAL SERVICE TO INDIA'S CIVILIAN COMMUNITY OVER A 7-YEAR-IN-ORBIT LIFESPAN. THE TELECOMMUNICATIONS PACKAGE PROVIDES TWO-WAY, LONG DISTANCE TELEPHONE CIRCUITS AND DIRECT RADIO AND TV BROADCASTING TO THE REMOTEST AREAS OF INDIA. THE METEOROLOGY PACKAGE IS COMPOSED OF A SCANNING VERY-HIGH-RESOLUTION, TWO-CHANNEL RADIOMETER (VHR) TO PROVIDE FULL-FRAME, FULL-EARTH COVERAGE EVERY 30 MINUTES. THE VISUAL CHANNEL (0.55-0.75 MICROMETERS) HAS A 2.75 KM RESOLUTION WHILE THE IR CHANNEL (10.5-12.5 MICROMETERS) HAS AN 11-KM RESOLUTION. USING THE INSAT TV CAPABILITY, EARLY WARNINGS OF IMPENDING DISASTERS (I.E., FLOODS, STORMS, ETC.) CAN DIRECTLY REACH THE CIVILIAN POPULATION, EVEN IN REMOTE AREAS. THE INSAT-1A ALSO HAS A DATA CHANNEL FOR RELAYING METEOROLOGICAL, HYDROLOGICAL, AND OCEANOGRAPHIC DATA FROM UNATTENDED LAND-BASED OR OCEAN-BASED DATA COLLECTION AND TRANSMISSION PLATFORMS.

***** INSAT-1B*****

SPACECRAFT COMMON NAME- INSAT-1B

ALTERNATE NAMES- INDIAN NATIONAL SAT.

NSSDC ID- INSAT1B

LAUNCH DATE- 1983

WEIGHT- KG

LAUNCH SITE-

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

INDIA

ISRO

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN
PERIAPSIS- 36000. KM ALT

INCLINATION-

APOAPSIS- 36000. KM ALT

PERSONNEL

BRIEF DESCRIPTION

THE INSAT-1 SATELLITE PROGRAM INCORPORATES TWO THREE-AXIS STABILIZED SPACECRAFT IN GEOSTATIONARY ORBIT (INSAT-1A AT 94 DEGREES E AND INSAT-1B AT 74 DEGREES E) WITH A HOST OF GROUND STATIONS THROUGHOUT INDIA. THE INSAT-1B SATELLITE, BUILT BY THE FORD AEROSPACE AND COMMUNICATIONS CORPORATION, PROVIDES A COMBINED TELECOMMUNICATIONS, DIRECT TV BROADCAST, AND METEOROLOGICAL SERVICE TO INDIA'S CIVILIAN COMMUNITY OVER A 7-YEAR-IN-ORBIT LIFESPAN. THE TELECOMMUNICATIONS PACKAGE WILL PROVIDE TWO-WAY, LONG-DISTANCE TELEPHONE CIRCUITS AND DIRECT RADIO AND TV BROADCASTING TO THE REMOTEST AREAS OF INDIA. THE METEOROLOGY PACKAGE IS COMPOSED OF A SCANNING VERY-HIGH-RESOLUTION, TWO-CHANNEL RADIOMETER (VHR) TO PROVIDE FULL-FRAME, FULL-EARTH COVERAGE EVERY 30 MINUTES. THE VISUAL CHANNEL (0.55-0.75 MICROMETERS) HAS A 2.75 KM RESOLUTION WHILE THE IR CHANNEL (10.5-12.5 MICROMETERS) HAS AN 11-KM RESOLUTION. USING THE INSAT TV CAPABILITY, EARLY WARNINGS OF IMPENDING DISASTERS (I.E., FLOODS, STORMS, ETC.) CAN DIRECTLY REACH THE CIVILIAN POPULATION, EVEN IN REMOTE AREAS. THE INSAT-1B ALSO HAS A DATA CHANNEL FOR RELAYING METEOROLOGICAL, HYDROLOGICAL, AND OCEANOGRAPHIC DATA FROM UNATTENDED LAND-BASED OR OCEAN-BASED DATA COLLECTION AND TRANSMISSION PLATFORMS.

***** IR ASTROM. SAT.*****

SPACECRAFT COMMON NAME- IR ASTROM. SAT.

ALTERNATE NAMES- INFRA-RED ASTROMON SAT, IRAS

NSDC ID- IRAS

LAUNCH DATE- 08/19/82 WEIGHT- 1000. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
THE NETHERLANDS NIVR
UNITED STATES NASA-OSS
UNITED KINGDOM SRC

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 103.1 MIN INCLINATION- 99. DEG
PERIAPSIS- 900. KM ALT APOAPSIS- 900. KM ALT

PERSONNEL
RG - R.E. HALPERN NASA HEADQUARTERS
SC - M.W. SOUGESS NASA HEADQUARTERS
PM - W.E. GIBERSON NASA-JPL
PS - M.M. AUMANN NASA-JPL

BRIEF DESCRIPTION
THE INFRARED ASTRONOMICAL SATELLITE (IRAS) IS A MISSION WITH JOINT EXECUTION BY THE UNITED STATES (NASA), THE NETHERLANDS, AND THE UNITED KINGDOM. THE BASIC GOAL OF THIS 1-YEAR MISSION IS TO OBTAIN A DEEP, FULL-SKY SURVEY OVER THE APPROXIMATE WAVELENGTH RANGE 8-300 MICROMETERS WITH FIVE BROADBAND PHOTOMETRY CHANNELS. THE IRAS CONTAINS A 0.6-METER RITCHIEY-CRUIKSHANK TELESCOPE COOLED BY HELIUM TO A TEMPERATURE OF NEAR 10 DEG K. AN ARRAY OF ABOUT 100 DETECTORS IS USED TO DETECT THE INFRARED FLUX IN BANDS CENTERED AT 10, 20, 50, AND 100 MICROMETERS. THE SENSITIVITY OF THE INSTRUMENT IS RESTRICTED BY THE PHOTON FLUCTUATIONS FROM THE ZODIACAL LIGHT. THE POSITIONS OF GALACTIC AND EXTRAGALACTIC SOURCES ARE DETERMINED TO AN ACCURACY OF 0.5 ARC MIN. IN ADDITION TO THE FOCAL-PLANE DETECTOR ARRAY USED FOR THE ALL-SKY SURVEY, BOTH A LOW-RESOLUTION SPECTROGRAPHIC AND A LONG-WAVELENGTH (GREATER THAN 100 MICROMETERS) PHOTOMETRIC CAPABILITY ARE INCLUDED ON THE IRAS. THE IRAS IS FLOWN IN A 900-KM ORBIT, WITH AN INCLINATION NEAR 99 DEG. TO EFFECT THE SCANNING OF THE SKY NEEDED FOR THE SURVEY, THE SATELLITE IS ROTATED AT A CONSTANT ANGULAR VELOCITY AROUND THE SUN VECTOR IN THE DIRECTION OF THE ORBITAL ANGULAR VELOCITY. THE IRAS IS ALSO ABLE TO DO POINTED OBSERVATIONS. HERE THE IRAS CAN BE POINTED AT A SELECTED CELESTIAL OBJECT FOR UP TO 17 MIN. THIS POINTING ABILITY PERMITS VERY SENSITIVE MEASUREMENTS ON THE FAINTER GALACTIC AND EXTRAGALACTIC SOURCES. THE SCIENCE WORKING GROUP IS LISTED IN APPENDIX B.

***** IRM*****

SPACECRAFT COMMON NAME- IRM
ALTERNATE NAMES- ION RELEASE MODULE, AMPTE/ION RELEASE MODULE

NSDC ID- IRM

LAUNCH DATE- 08/01/84 WEIGHT- 600. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
FED REP OF GERMANY MPI

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 312.3 MIN INCLINATION- 28.5 DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 127560. KM ALT

PERSONNEL
PM - U. JONELEIT DFVLR
PM - G.W. OUSLEY NASA-GSFC
PS - G. HAERENDEL MPI-EXTRATERM PHYS

BRIEF DESCRIPTION
THIS SPACECRAFT CARRIES SIX LI AND FOUR BA ION RELEASE CANISTERS ALONG WITH A 5-M SENSOR AND 3-AXIS MAGNETOMETER ATTITUDE DETERMINATION SYSTEM. THE POWER SYSTEM CONSISTS OF SOLAR PANELS TO PROVIDE 80 W, AND A BATTERY. THE SPACECRAFT SPIN STABILIZES AT 30 RPM. THE THERMAL SYSTEM EMPLOYS ACTIVE HEATERS AND MULTILAYER INSULATION. THE TELEMETRY SYSTEM IS A 0.5 W S-BAND TRANSMITTER. THE FLEETSTEDT MAGNETOMETER IS SENSITIVE TO FIELDS FROM 0.5 TO 3.100 NT AND IS THE ONLY DETECTION INSTRUMENT ON BOARD. IONS RELEASED ARE TO BE DETECTED BY INSTRUMENTS ON THE CCE SPACECRAFT. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX B.

***** IRM, HAERENDEL*****

INVESTIGATION NAME- LI AND BA RELEASE MODULE

NSDC ID- IRM -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - G. HAERENDEL MPI-EXTRATERM PHYS
OI - M. FOPPL MPI-EXTRATERM PHYS
OI - B. HAUDLER MPI-EXTRATERM PHYS
OI - A. VALENZUELA MPI-EXTRATERM PHYS

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF SIX LI AND FOUR BA ION-RELEASE CANISTERS, CONTAINING A TOTAL OF 300 KG OF CHEMICALS. ONE LI RELEASE OF APPROXIMATELY 1.626 ATOMS, OCCURRING OUTSIDE THE MAGNETOSPHERE NEAR THE SUBSOLAR POINT, IS DETECTED INSIDE THE MAGNETOSPHERE BY INSTRUMENTS ON THE CCE SPACECRAFT. ADDITIONAL LI RELEASES, BA RELEASES, AND AN ARTIFICIAL COMET RELEASE WILL BE MADE AS THE ORBIT PRECEDES TO THE MAGNETOSPHERIC TAIL.

***** ISPM/ESA*****

SPACECRAFT COMMON NAME- ISPM/ESA
ALTERNATE NAMES- ISPM-B, ISP
INT SOLAR POLAR, SOLAR POLAR

NSDC ID- ISPESA

LAUNCH DATE- 04/25/89 WEIGHT- 450. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 2020. DAYS INCLINATION- 70. DEG
PERIAPSIS- 1.0 AU RAD APOAPSIS- 9.24 AU RAD

PERSONNEL
PM - D. EATON ESA-ESTEC
PS - K.P. WENZEL ESA-ESTEC

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVES OF THE INTERNATIONAL SOLAR POLAR MISSION (ISPM) ARE TO INVESTIGATE, AS A FUNCTION OF SOLAR LATITUDE, THE PROPERTIES OF THE SOLAR CORONA, THE SOLAR WIND, THE STRUCTURE OF THE SUN-WIND INTERFACE, THE HELIOSPHERIC MAGNETIC FIELD, SOLAR AND NON-SOLAR COSMIC RAYS, SOLAR RADIO BURSTS AND PLASMA WAVES, AND THE INTERSTELLAR/INTERPLANETARY NEUTRAL GAS AND DUST. SECONDARY OBJECTIVES INCLUDE INTERPLANETARY AND PHYSICS INVESTIGATIONS DURING THE INITIAL EARTH-JUPITER PHASE IN MAY 1984. THE JUPITER ENCOUNTER TAKES THE SPACECRAFT JUST INSIDE IO'S ORBIT. AFTER JUPITER FLYBY, THE SPACECRAFT TRAVELS IN A HELIOCENTRIC ORBIT WITH HIGH HELIOGRAPHIC INCLINATION, AND PASSES OVER THE ROTATIONAL POLE OF THE SUN. SPACECRAFT DESIGN IS STILL UNDER STUDY. A JOINT NASA/ESA RADIO-SCIENCE TEAM CONDUCTS INDIVIDUAL INVESTIGATIONS IN ADDITION TO THE SEPARATE EXPERIMENTS. THE MISSION INCLUDES THEORETICAL AND INTERDISCIPLINARY INVESTIGATIONS. THE SCIENTISTS FOR THESE INVESTIGATIONS ARE LISTED IN APPENDIX B. THE ORIGINAL MISSION CONSISTED OF TWO SPACECRAFT BUT NASA IS CURRENTLY STUDYING THE SECOND MISSION.

***** ISPM/ESA, WAKE*****

INVESTIGATION NAME- PLASMA SPECTROMETER

NSDC ID- ISPESA -05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - S.J. BARE LOS ALAMOS NAT LAB

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO INVESTIGATE AND ESTABLISH BULK-FLOW PARAMETERS AND INTERNAL-STATE VARIATIONS OF THE SOLAR WIND AS FUNCTIONS OF SOLAR LATITUDE; (2) TO INVESTIGATE RADIAL VARIATIONS OF SOLAR WIND PROPERTIES BETWEEN EARTH AND JUPITER; AND (3) TO INVESTIGATE THE SOLAR WIND INTERACTION WITH THE JOVIAN MAGNETOSPHERE. THE INSTRUMENT CONSISTS OF TWO SENSOR SYSTEMS AND ASSOCIATED ELECTRONICS THAT INTERFACE WITH THE SPACECRAFT. ELECTRONS ARE MEASURED BY A 125-DEG SPHERICAL-SECTION ELECTROSTATIC ANALYZER WITH SEVEN CHANNEL ELECTRON MULTIPLIERS (CEM'S) WHICH COVER A POLAR ANGLE RANGE OF 146 DEG. THE ANALYZER IS ENCLOSED IN A LIGHT-TIGHT PACKAGE WITH AN ENTRANCE APERTURE OF 1 CM WIDTH. THE GAP WIDTH IS 0.30 CM AND THE AVERAGE RADIUS OF CURVATURE IS 4.5 CM. THE ANALYZER HAS A GEOMETRIC FACTOR (G) OF 4.7 E-5 SO CM-SR. THE SOLAR WIND ION ANALYZER MAKES THREE-DIMENSIONAL MEASUREMENTS OF SOLAR WIND IONS WITH ENERGIES IN THE RANGE BETWEEN 257 EV AND 35 KEV PER CHARGE. IT CONSISTS OF A 150-DEG SPHERICAL-SECTION ELECTROSTATIC ANALYZER FITTED WITH 17 CEM SENSORS WHICH COVER A POLAR ANGLE RANGE OF 80 DEG. IT IS MOUNTED SO THAT ONLY ONE OF ITS POLAR ANGLE OF ACCEPTANCE IS PARALLEL TO THE SPIN AXIS. A STEPPING MOTOR IS USED TO ROTATE ANY ONE OF SEVEN APERTURES INTO PLACE. THE MASS OF THE ELECTRON INSTRUMENT IS 2.35 KG. IT USES 2 W MEAN AND 3 W PEAK, AND HAS A DATA RATE OF 20 OPS IN CRUISE MODE AND 40 OPS IN TRACKING MODE. THE MASS OF THE ION INSTRUMENT IS 4.62 KG. IT USES 4 W MEAN AND 10 W PEAK, AND HAS A DATA RATE OF 50 OPS IN CRUISE MODE AND 100 OPS IN TRACKING

MODE.

----- ISPM/ESA, ESPOSITO-----

INVESTIGATION NAME- RADIO SCIENCE

NSSDC ID- ISPESA -09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
SOLAR PHYSICS

PERSONNEL

TL - P.D. ESPOSITO
TM - H.E. VOLLAND
TM - B. BERTOTTI
TM - P.S. CALLAMAN

NASA-JPL
U OF BONN
U OF PAVIA
NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO UTILIZE THE ISPM/ESA SPACECRAFT AND THE NASA DEEP-SPACE NETWORK FOR DIFFERENT STUDIES CONDUCTED BY INDIVIDUAL MEMBERS OF THE RADIO-SCIENCE TEAM. STUDIES INCLUDE THE FOLLOWING: (1) DETERMINE THE CORONAL, INTEGRATED ELECTRON DENSITY AND THE GLOBAL CORONAL ELECTRON DENSITY AS A FUNCTION OF HELIOCENTRIC RADIAL DISTANCE AND LATITUDES; (2) INVESTIGATE THE MAGNITUDE AND LOCATION OF CHANGES IN THE ELECTRON DENSITY ALONG THE LINE OF SIGHT TO DETERMINE THE STRUCTURE AND TIME HISTORY OF DENSITY FLUCTUATIONS IN THE SOLAR WIND; AND (3) DETERMINE THE VELOCITY OF THE SOLAR WIND CLOSE TO THE SUN, AND DETERMINE THE STRUCTURE OF THE CORONAL ELECTRON DENSITY CLOSE TO THE SUN. IN ADDITION, THERE ARE SEVERAL OTHER INVESTIGATIONS WHICH ARE UNDER STUDY.

----- ISPM/ESA, GLOECKLER-----

INVESTIGATION NAME- SOLAR-WIND COMPOSITION SPECTROMETER

NSSDC ID- ISPESA -04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - G. GLOECKLER
OI - J. GEISS

U OF MARYLAND
U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE ELEMENTAL AND IONIC-CHARGE COMPOSITION AND THE TEMPERATURES AND MEAN SPEEDS OF ALL MAJOR SOLAR WIND IONS FROM W THROUGH FE. THE INSTRUMENT CONSISTS OF A DEFLECTION ASSEMBLY, A HIGH-VOLTAGE MIDDLE CONTAINING ANALOG ELECTRONICS, A POST-ACCELERATION 30 KV SUPPLY, A POINTING DEVICE, AND ELECTRONICS FOR DATA PROCESSING AND POWER CONVERSION. THE INSTRUMENT HAS A MASS OF 4.5 KG, USES 3.6 W MEAN AND 11.6 W PEAK POWER, AND HAS A DATA RATE OF 45 BPS IN CRUISE MODE AND 80 BPS IN TRACKING MODE.

----- ISPM/ESA, GRUN-----

INVESTIGATION NAME- COSMIC DUST

NSSDC ID- ISPESA -07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
DUST

PERSONNEL

PI - E. GRUN

MPI-NUCLEAR PHYS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO INVESTIGATE PARTICULATE MATTER WITH MASSES BETWEEN 1×10^{-16} G AND 1×10^{-7} G IN THE HELIOSPHERE; DETERMINE ITS PHYSICAL AND DYNAMICAL PROPERTIES AS A FUNCTION OF ECLIPTIC LATITUDE AND HELIOCENTRIC DISTANCE; AND INVESTIGATE ITS INTERACTION WITH OTHER INTERPLANETARY/INTERSTELLAR PHENOMENA SUCH AS SOLAR RADIATION, SOLAR WIND, HELIOSPHERIC MAGNETIC FIELD, AND INTERSTELLAR NEUTRAL GAS. THIS INSTRUMENT COMPRISES A SENSOR WITH CHANNELTRON AND ASSOCIATED ELECTRONICS SUCH AS PREAMPLIFIERS, SIGNAL CONDITIONERS, AND SPACECRAFT INTERFACE UNITS. THE INSTRUMENT HAS A MASS OF 2.7 KG AND USES 1.5 W OF POWER. THE DATA RATE IS 3 BPS.

----- ISPM/ESA, HEDGECOCK-----

INVESTIGATION NAME- MAGNETIC FIELD

NSSDC ID- ISPESA -08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - P.C. HEDGECOCK

IMPERIAL COLLEGE

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO INVESTIGATE THE STRENGTH AND GEOMETRY OF THE INTERPLANETARY MAGNETIC FIELD IN THE INNER HELIOSPHERE (PARTICULARLY AT HIGH SOLAR LATITUDES) AND TO INVESTIGATE THE HELIOGRAPHIC LATITUDE DEPENDENCE OF THE FIELD FLUCTUATION SPECTRA WITH SPECIAL EMPHASIS ON THE FREQUENCY RANGE BELOW 0.01 MZ. SECONDARY OBJECTIVES ARE TO STUDY THE INTERNAL DYNAMICS OF THE SOLAR WIND, THE ROLE OF DISCONTINUITIES AND WAVES IN THE INTERPLANETARY FIELD ON PROPAGATION AND ACCELERATION OF ENERGETIC PARTICLES, THE INTERPLANETARY PROPAGATION AND DEVELOPMENT OF DISCONTINUITIES AND WAVES, AND THE STRUCTURE AND DYNAMICS OF THE DUSK REGION OF THE JOVIAN MAGNETOSPHERE. THE INSTRUMENT CONSISTS OF A TRIAXIAL FLUXGATE MAGNETOMETER, A VECTOR HELIUM MAGNETOMETER, A BOOM, AND ASSOCIATED ELECTRONICS. THE INSTRUMENT HAS A MASS OF 4.96 KG EXCLUDING THE BOOM. IT HAS A DATA RATE OF 40 BPS IN THE CRUISE MODE AND 80 BPS IN THE TRACKING MODE. IT USES 5.22 W OF POWER.

----- ISPM/ESA, MURLEY-----

INVESTIGATION NAME- SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST

NSSDC ID- ISPESA -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
GAMMA-RAY ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL

PI - K.C. MURLEY
OI - M.K. SOMMER

CERN
MPI-EXTRATERM PHYS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE ACCELERATION AND STORAGE OF ENERGETIC ELECTRONS ACCELERATED DURING SOLAR FLARES BY MEASURING SOLAR X-RADIATION; TO IDENTIFY GAMMA-RAY BURST SOURCES WITH KNOWN CELESTIAL OBJECTS OR PHENOMENA; AND TO STUDY PLASMA AND ENERGETIC CHARGED PARTICLE PROCESSES IN THE JOVIAN MAGNETOSPHERE. THIS INVESTIGATION IS SIMILAR TO THE NASA EXPERIMENT ISPM/NASA-02 (CLINE). THE INSTRUMENT CONSISTS OF TWO HEMISPHERICAL CESIUM IODIDE (SODIUM) CRYSTALS COUPLED TO TWO CURVED CATHODE PHOTOMULTIPLIERS; TWO SMALL SOLID-STATE DETECTORS CLOSE TO THE TWO CRYSTALS, WITH AN AMERICIUM 241 RADIOACTIVE SOURCE DEPOSITED ON THE SURFACES OF THE SOLID-STATE DETECTORS; ONE PROPORTIONAL COUNTER; AND A DIGITAL ELECTRONICS UNIT. THE SCINTILLATION COUNTERS MEASURE X-RAYS IN THE ENERGY RANGE FROM 15 KEV TO 150 KEV, WHILE THE PROPORTIONAL COUNTER MEASURES X-RAYS FROM 5 KEV TO 15 KEV. THE SOLID-STATE DETECTORS ARE USED TO CALIBRATE THE SCINTILLATORS. IN ADDITION, THEY ACT AS BACKUP DETECTORS IN CASE OF A SCINTILLATION COUNTER FAILURE. THE INSTRUMENT HAS A MASS OF 11.17 KG, USES 11.2 W MEAN AND 11.7 W PEAK POWER, AND HAS A DATA RATE OF 80 BPS IN CRUISE MODE AND 160 BPS IN TRACKING MODE.

----- ISPM/ESA, LANZEROTTI-----

INVESTIGATION NAME- HELIOSPHERE

NSSDC ID- ISPESA -03

INVESTIGATIVE PROGRAM
CODE ST/CO-UP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - L.J. LANZEROTTI

BELL TELEPHONE LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO INVESTIGATE THE SOLAR-FLARE PROCESS WITH MEASUREMENTS OF NON-RELATIVISTIC AND RELATIVISTIC ELECTRONS, AND NON-RELATIVISTIC IONS, AND THEIR DEPENDENCE ON HELIO-LATITUDE; (2) TO INVESTIGATE SOLAR ELEMENTAL ABUNDANCES WITH MEASUREMENTS OF CHEMICAL AND ISOTOPIC COMPOSITION OF NUCLEI OF SOLAR ORIGIN AT ALL HELIO-LATITUDES; (3) TO INVESTIGATE THE INTERPLANETARY PROPAGATION OF SOLAR ENERGETIC PARTICLES BY MEASUREMENT OF ANISOTROPY AND COMPOSITION PARAMETERS; (4) TO INVESTIGATE ACCELERATION PROCESSES; AND (5) TO INVESTIGATE TEMPORAL AND SPATIAL VARIATIONS OF PARTICLE INTENSITY IN AND NEAR THE JOVIAN MAGNETOSPHERE. THE INSTRUMENTATION CONSISTS OF THREE SENSORS. THE PRIMARY DETECTOR MEASURES PROTONS AND IONS AT LOW ENERGIES (G.T. 20 KEV) WITH A GEOMETRY FACTOR (G) OF APPROXIMATELY 9.5×10^4 CM-SR. A HALE-EARTH-ALLOY MAGNET DEFLECTS ELECTRONS WITH ENERGIES LT. 400 KEV AWAY FROM THE PRIMARY DETECTOR TO SENSOR 2. THE OUTPUT IS FED INTO WINDOW-TYPE DISCRIMINATORS WHICH PROVIDE SEVEN PROTON-ION DIFFERENTIAL-ENERGY CHANNELS IN THE RANGE FROM 0.02 MEV TO 5.0 MEV. THE OUTPUT IS ALSO PULSE-HEIGHT ANALYZED IN SECTORS. SENSOR 2 PROVIDES UNIQUE IDENTIFICATION OF LOW-ENERGY (G.T. 15 KEV) ELECTRONS, WITH A G APPROXIMATELY EQUAL TO 0.05×10^4 CM-SR. FOUR DIFFERENTIAL ENERGY CHANNELS PROVIDE OUTPUTS OVER THE 15 KEV TO 240 KEV ENERGY RANGE. SENSOR 3 IS BEHIND A NICKEL-FOIL SHIELD, WITH A VIEW DIRECTION OPPOSITE THAT OF SENSOR 2. THE FOIL STOPS PROTONS UP TO APPROXIMATELY 0.3 MEV, BUT ALLOWS PENETRATION OF LOW-ENERGY ELECTRONS. ELECTRONS ARE DETECTED FROM 30 KEV TO 400 KEV, AND

PROTONS FROM 0.40 MEV TO 5.0 MEV. THE INSTRUMENT HAS A MASS OF 3.7 KG, A 4-W POWER USAGE, AND A DATA RATE OF 80 BPS IN CRUISE MODE AND 176 BPS IN TRACKING MODE.

----- ISPM/ESA, SIMPSON-----

INVESTIGATION NAME- COSMIC RAY AND CHARGED PARTICLE

NSSDC ID- ISPESA -02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON

U OF CHICAGO

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE ENERGY, CHARGE, AND MASS SPECTRA OF ENERGETIC CHARGED PARTICLES IN INTERPLANETARY SPACE IN THE ENERGY RANGE FROM APPROXIMATELY 0.5 MEV/NUCLEON (FOR PROTONS) TO APPROXIMATELY 100 MEV/NUCLEON; AND TO STUDY SPATIAL GRADIENTS AND THE PROPAGATION OF CHARGED PARTICLES THROUGHOUT THE HELIOSPHERE BY MEASURING ABSOLUTE FLUX AND VECTOR ANISOTROPY. THE INSTRUMENT CONSISTS OF SIX CHARGED-PARTICLE TELESCOPES (CPT) AND ASSOCIATED ELECTRONICS. THE HIGH-ENERGY TELESCOPE PROVIDES MEASUREMENTS OF THE CHEMICAL AND ISOTOPIC COMPOSITION AND OF THE ENERGY SPECTRUM OF THE COSMIC RADIATION ABOVE APPROXIMATELY 10 MEV/NUCLEON. THE LOW-ENERGY TELESCOPE (LET) EXTENDS CHEMICAL COMPOSITION AND SPECTRAL MEASUREMENTS DOWNWARD TO .LE. 1 MEV/NUCLEON. THE ANISOTROPY TELESCOPES, IN CONJUNCTION WITH THE LET, PROVIDE A MEANS OF DETERMINING THE DISTRIBUTION OF ARRIVAL DIRECTIONS IN THREE DIMENSIONS OF LOW-ENERGY PROTONS AND HE NUCLEI. THE HIGH-FLUX TELESCOPE PROVIDES MEASUREMENTS OF THE INTENSITY AND ARRIVAL DIRECTION OF PROTONS, HELIUM, CNO, AND FE GROUP NUCLEI IN HIGH-FLUX ENVIRONMENTS, SUCH AS INTENSE SOLAR FLARES OR JUPITER'S MAGNETOSPHERE, WHERE THE OTHER SENSOR SYSTEMS MAY BECOME SATURATED. EACH CPT PROVIDES OUTPUT TO A DATA-PROCESSING UNIT (DPU). THE ELECTRON TELESCOPE CONSISTS OF A ONE DOUBLE CERENKOV AND SEMICONDUCTOR DETECTOR TELESCOPE WHICH INTERFACE WITH THE DPU. THE INSTRUMENT HAS A MASS OF 11.17 KG AND USES 11.2 W MEAN AND 11.7 W PEAK POWER. THE DATA RATE IS 80 BPS IN CRUISE MODE AND 160 BPS IN TRACKING MODE.

----- ISPM/ESA, STONE-----

INVESTIGATION NAME- UNIFIED RADIO AND PLASMA WAVE

NSSDC ID- ISPESA -06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - R.G. STONE

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO INVESTIGATE SOURCE POSITIONS OF TRAVELLING SOLAR RADIO BURSTS IN THE RANGE FROM DC TO 1 MHZ; (2) TO INVESTIGATE THE LARGE-SCALE MAGNETIC FIELD TOPOLOGY AND THE ELECTRON DENSITY ALONG THE EXCITER TRAJECTORY AS A FUNCTION OF HELIOGRAPHIC LATITUDE AND LONGITUDE AT DISTANCES OF 0.1 AU TO APPROXIMATELY 5 AU; (3) TO INVESTIGATE JOVIAN RADIO SOURCE LOCATIONS IN THE RANGE FROM DC TO 1 MHZ; AND (4) TO INVESTIGATE WAVES IN THE PLASMA BETWEEN DC AND 30 KHZ, THEIR INSTABILITIES, THEIR ENERGY TRANSPORT MECHANISMS, AND THE THERMAL ELECTRON DENSITY. THIS INVESTIGATION OPERATES IN CONJUNCTION WITH THE SIMILAR INVESTIGATION ISPM/NASA-05 (STONE). THE INSTRUMENT COMPRISES THREE ANTENNA SYSTEMS (A 70-M TIP-TO-TIP DIPOLE IN THE EQUATORIAL PLANE, A MONOPOLE ALONG THE SPIN AXIS, AND A PAIR OF CROSSED-AXIS MAGNETIC SEARCH COILS LOCATED IN THE EQUATORIAL PLANE) AND FOUR RECEIVER SYSTEMS (AN RF RECEIVER FOR 5 KHZ TO 1 MHZ IN TWO INTERVALS FROM 5 TO 30 KHZ AND FROM 30 KHZ TO 1 MHZ; A PLASMA FREQUENCY RECEIVER COVERING FROM 0.8 KHZ TO 30 KHZ IN 32 CONTIGUOUS INTERVALS; A FAST ENVELOPE SAMPLER 0.2 KHZ TO 60 KHZ WITH FOUR COMMANDABLE DECADE RANGES TO CAPTURE TRANSIENT EVENTS; AND A WAVE FORM ANALYZER, DC TO 1 KHZ, THAT OPERATES IN TWO FREQUENCY BANDS, FROM DC TO 10 HZ AND FROM 10 HZ TO 1 KHZ). THE INSTRUMENT HAS A MASS OF 6.86 KG, EXCLUDING ANTENNAS AND BOOMS, AND HAS A DATA RATE OF 116 BPS. IT USES 8.22 W OF POWER.

***** ISPM/NASA*****

SPACECRAFT COMMON NAME- ISPM/NASA

ALTERNATE NAMES- ISPM-A, ISP

INT SOLAR POLAR, SOLAR POLAR

NSSDC ID- ISPNASA

LAUNCH DATE- 03/27/85

WEIGHT- 450. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 8020. DAYS
PERIAPSIS- 1.0 AU RAD

INCLINATION- 70. DEG
APOAPSIS- 5.24 AU RAD

PERSONNEL

MG - R.E. McDONALD
PM - H.W. MORRIS
PS - E.J. SMITH

NASA HEADQUARTERS
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THE INTERNATIONAL SOLAR POLAR MISSION (ISPM) ARE FOR TWO SPACECRAFT TO INVESTIGATE, AS A FUNCTION OF SOLAR LATITUDE, THE PROPERTIES OF THE SOLAR CORONA, THE SOLAR WIND, THE STRUCTURE OF THE SUN-WIND INTERFACE, THE HELIOSPHERIC MAGNETIC FIELD, SOLAR AND NON-SOLAR COSMIC RAYS, SOLAR RADIO BURSTS AND PLASMA WAVES, AND THE INTERSTELLAR/INTERPLANETARY NEUTRAL GAS AND DUST. SECONDARY OBJECTIVES INCLUDE INTERPLANETARY PHYSICS INVESTIGATIONS DURING THE INITIAL EARTH-JUPITER PHASE, WHEN THE SEPARATION OF THE ESA AND THE NASA SPACECRAFT IS APPROXIMATELY 0.01 AU, AND MEASUREMENTS OF THE JOVIAN MAGNETOSPHERE DURING THE JUPITER FLYBY PHASE. THE TWO SPACECRAFT FOR THIS MISSION (ISPM/NASA AND ISPM/ESA) TRAVEL TO JUPITER WITH A CLOSE ENCOUNTER IN MAY 1984. THEN, ONE SPACECRAFT IS PLACED INTO A NORTH TRAJECTORY (RELATIVE TO THE SOLAR ECLIPTIC) AND THE OTHER INTO A SOUTH TRAJECTORY. THE JUPITER ENCOUNTER TAKES BOTH SPACECRAFT JUST INSIDE IO'S ORBIT. AFTER JUPITER FLYBY, BOTH SPACECRAFT TRAVEL IN HELIOCENTRIC OUT-OF- ECLIPTIC ORBITS WITH HIGH HELIOGRAPHIC INCLINATION, AND PASS OVER THE ROTATIONAL POLES OF THE SUN. SPACECRAFT DESIGN IS STILL UNDER STUDY. A JOINT NASA/ESA RADIO SCIENCE TEAM CONDUCTS INDIVIDUAL INVESTIGATIONS IN ADDITION TO THE SEPARATE EXPERIMENTS. THE MISSIONS INCLUDE THEORETICAL AND INTERDISCIPLINARY INVESTIGATIONS. THE SCIENTISTS FOR THESE INVESTIGATIONS ARE LISTED IN APPENDIX B. THE NASA SPACECRAFT PORTION OF THIS MISSION IS CURRENTLY UNDER STUDY AND A DECISION ON NASA PARTICIPATION HAS NOT BEEN MADE.

----- ISPM/NASA, ACUNA-----

INVESTIGATION NAME- MAGNETIC FIELD (MAG)

NSSDC ID- ISPNASA-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - M.H. ACUNA

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (MAG) IS TO MEASURE THE JOVIAN AND INTERPLANETARY VECTOR MAGNETIC FIELD TO INVESTIGATE THE LARGE-SCALE THREE-DIMENSIONAL STRUCTURE OF THE HELIOSPHERIC FIELD, ITS SOLAR ORIGIN, AND ITS SMALL-SCALE CHARACTERISTICS. THE MAG HAS A TIME RESOLUTION OF UP TO 20 VECTORS/S, A PRECISION OF 0.025 PERCENT, AN ACCURACY OF 0.12 NT, A SENSITIVITY OF 0.004 NT, AND A DYNAMIC RANGE OF PLUS OR MINUS 4,096 NT. MAG USES A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED NEAR THE TIP OF A BOOM WITH AN INBOARD SENSOR MOUNTED ABOUT HALFWAY TO TWO-THIRDS OF THE WAY ALONG THE BOOM LENGTH. NORMAL DATA MODE IS 1 VECTOR/S WITH AN AUTOMATIC SWITCH TO 20 VECTORS/S BASED ON THE CHARACTERISTICS OF DATA OBSERVED IN THE PRECEDING PERIOD OF TIME. THE INSTRUMENT HAS A MASS OF 3.12 KG, USES 1.5 W OF POWER, AND HAS A BIT RATE OF 11 TO 220 BPS IN CRUISE MODE AND 26 TO 520 BPS IN TRACKING MODE. 20 VECTOR DATA ARE STORED FOR LATER (SLOWER) TRANSMISSION.

----- ISPM/NASA, CLINE-----

INVESTIGATION NAME- SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SXR)

NSSDC ID- ISPNASA-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
GAMMA-RAY ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL

PI - T.L. CLINE

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (SXR) ARE TO STUDY THE ACCELERATION, STORAGE AND ESCAPE PROCESSES OF ENERGETIC ELECTRONS IN SOLAR FLARES, TO IDENTIFY THE SOURCE OBJECTS OF COSMIC GAMMA-RAY BURSTS AND TO SEARCH FOR JOVIAN X-RAYS. THIS INVESTIGATION IS SIMILAR TO THE ESA EXPERIMENT ISPM/ESA-01 (MURLEY). THE INVESTIGATION USES TWO HEMISPHERICAL SCINTILLATION SHELLS MOUNTED ON TWO PHOTOMULTIPLIER TUBES THAT PROVIDE INPUT TO A PROPORTIONAL COUNTER FOR LOWER ENERGY SENSITIVITY. THE GAIN, TRIGGER COMPARTOR, CALIBRATION TRIGGER, AND A FOUR-LEVEL SPECTRAL ANALYZER ARE COMMANDABLE. THE INSTRUMENT HAS A MASS OF 1.4 KG, USES 1.2 W OF POWER, AND HAS A DATA RATE OF 12 BPS.

----- ISPM/NASA, GIESE-----

INVESTIGATION NAME- ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE)

NSSDC ID- ISPHASA-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
ZODIACAL LIGHT

PERSONNEL

PI - R.H. GIESE

RUMR-U BOCHUM

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (ZLE) ARE TO STUDY THE MULTICOLOR (INCLUDING UV) BRIGHTNESS AND POLARIZATION OF REMOTE LIGHT SOURCES (INTEGRATED STARLIGHT, DIFFUSE GALACTIC LIGHT) AND OF THE LIGHT SCATTERED BY THE INTERPLANETARY DUST CLOUD AS A FUNCTION OF ECLIPTIC LATITUDE AND HELIOCENTRIC DISTANCE. THE ZLE USES A SENSOR WITH A STRAY-LIGHT BAFFLE AND ELECTRONICS. THE SENSOR CONSISTS OF OPTICS, A BEAMSPLITTER, AND 2 PHOTOMULTIPLIER TUBES AS DETECTORS. INTERFERENCE FILTERS IN EACH CHANNEL PROVIDE SPECTRAL INFORMATION IN UP TO 8 CHANNELS. THERE ARE POLARIZATION WHEELS IN EACH LIGHT PATH WITH FOUR SETTINGS. THE INSTRUMENT DIVIDES THE SKY INTO EITHER 32 OR 64 EQUAL SECTORS FOR MEASURING ANGULAR DISTRIBUTION, AND DATA ARE INTEGRATED OVER 25 TO 250 REVOLUTIONS. THE INSTRUMENT HAS A MASS OF 6.0 KG WITH A DATA RATE OF 36 TO 90 BPS IN CRUISE MODE.

----- ISPM/NASA, MACQUEEN-----

INVESTIGATION NAME- WHITE-LIGHT CORONAGRAPH/X-RAY XUV TELESCOPE (CXX)

NSSDC ID- ISPHASA-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - R.H. MACQUEEN

HIGH ALTITUDE OBS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (CXX) ARE TO IMAGE THE SOLAR ATMOSPHERE FROM THE CHROMOSPHERE TO THE OUTER CORONA OVER A WIDE RANGE OF ALTITUDES AND SOLAR LATITUDES, OBTAIN THREE-DIMENSIONAL STRUCTURE OF THE SOLAR CORONA, INVESTIGATE THE CORONAL INFLUENCE ON THE SOLAR WIND, AND INVESTIGATE THE RELATION BETWEEN THE CORONA AND UNDERLYING PHENOMENA. THE CORONAGRAPH USES A FOUR-FILTER POSITION WHEEL WITH THREE POLARIZATION FILTERS AND ONE OPEN POSITION. THE INSTRUMENT HAS A 450 TO 650 NM SPECTRAL SENSITIVITY WITH A 10- TO 20-ARC-S RESOLUTION. THE FULL DUTY CYCLE IS FOUR PICTURES, EACH 800 BY 800 PIXELS. THE X-RAY XUV TELESCOPE IS A WOLTER TYPE I GRAZING-INCIDENCE SYSTEM WITH 12 FILTER POSITIONS. THE SPECTRAL SENSITIVITY IS FROM 0.3 TO 6 NM AND 17.1 TO 55 NM WITH A 4-ARC-S RESOLUTION. EACH IMAGE IS 800 BY 800 PIXELS. THERE ARE NINE BANDPASS FILTERS. THE INSTRUMENT HAS A MASS OF 8.1 KG AND USES 4.0 W CONTINUOUS WITH 5.5 W AT PEAK. THE DATA RETURN RATE IS 1.6 E7 BITS PER DAY NOMINAL TO 6.4 E7 BITS PER DAY.

----- ISPM/NASA, ROSENBAUER-----

INVESTIGATION NAME- MASS SEPARATING SOLAR WIND (SWE)

NSSDC ID- ISPHASA-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - H.R. ROSENBAUER

MPI-AERONOMY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (SWE) IS TO STUDY SOLAR WIND PHENOMENOLOGY IN THREE DIMENSIONS BY MEASURING ION AND ELECTRON VELOCITY, ANGLES, AND MASS PER CHARGE. IT USES TWO SEPARABLE SENSOR SYSTEMS: AN ION MASS/CHARGE SPECTROMETER WITH A MECHANICAL STEPPING OF THE FOV, 11 DETECTORS, AND A RESOLUTION OF VELOCITY AND MASS/CHARGE OF ABOUT 20 PERCENT; AND AN ELECTROSTATIC ANALYZER WITH AN ENERGY THRESHOLD OF 0.5 EV, 7 DETECTORS, AND MEASUREMENTS IN 64 BANDS BETWEEN 8 EV AND 1600 EV. THE INSTRUMENT HAS A MASS OF 6.05 KG, USES 3.0 W OF POWER, AND HAS A BIT RATE OF 50 BPS DURING CRUISE MODE AND 500 TO 1000 BPS DURING TRACKING MODE.

----- ISPM/NASA, ROSENBAUER-----

INVESTIGATION NAME- DIRECT MEASUREMENT OF INTERSTELLAR GAS USING HE AS TRACER (NGM)

NSSDC ID- ISPHASA-07

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - H.R. ROSENBAUER

MPI-AERONOMY

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (NGM) ARE TO STUDY THE TEMPERATURE, BULK VELOCITY, AND DENSITY OF INTERSTELLAR GAS IN THE VICINITY OF THE SOLAR SYSTEM. THE INVESTIGATION USES A CHANNEL ELECTRON MULTIPLIER CHANNELTRON TO AMPLIFY AND COUNT SECONDARY ELECTRONS PRODUCED BY A LITHIUM FLUORIDE (LIF) PLANE SURFACE WHICH IS HEATED TO EVAPORATE AND PROVIDE FRESH LAYERS OF LIF AT INTERVALS. THIS SURFACE ALSO DETECTS HE ATOMS. A MECHANICAL COLLIMATOR SUPPRESSES CHARGED PARTICLES AND PHOTOELECTRONS. A STEPPING MOTOR PROVIDES AUTOMATIC SCANNING. THE INSTRUMENT USES 0.91 W STEADY AND 1.5 W PEAK POWER. THE BIT RATE IS 1 TO 2 BPS.

----- ISPM/NASA, STONE-----

INVESTIGATION NAME- COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA)

NSSDC ID- ISPHASA-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - E.C. STONE

CALIF INST OF TECH

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (CPA) IS TO MEASURE ELEMENTAL COMPOSITION, ENERGY SPECTRA, AND ANGULAR DISTRIBUTIONS OF PARTICLES. THE PARTICLE ENERGY RANGE IS 40 KEV/NUCLEON THROUGH 400 MEV/NUCLEON. THE ISOTOPIC COMPOSITION IS MEASURED OVER THE ENERGY LEVELS 0.1 MEV/NUCLEON THROUGH 64 MEV/NUCLEON FOR H AND HE, 13 MEV/NUCLEON THROUGH 400 MEV/NUCLEON FOR FE, AND 30 KEV TO 120 KEV FOR ELECTRONS. OTHER OBJECTIVES FOLLOW: (1) STUDY SPECTRAL DIFFERENCES AND STREAMING PATTERNS AT HIGH SOLAR LATITUDES; (2) INVESTIGATE THE ORIGIN OF THE LOW-ENERGY COSMIC RAY COMPONENT; (3) STUDY LATITUDE-DEPENDENT ACCELERATION MECHANISMS; (4) STUDY HELIOSPHERIC PROPAGATION OF JOVIAN ELECTRONS; AND (5) STUDY THE ORIGIN, ACCELERATION, AND BEHAVIOR OF ENERGETIC PARTICLES IN THE JOVIAN MAGNETOSPHERE. FIVE SENSOR SYSTEMS MOUNTED AS A SINGLE UNIT ARE USED. THEY ARE A MASS SPECTROMETER TELESCOPE, A PROTON-ELECTRON TELESCOPE, A LOW-ENERGY ION TELESCOPE, A SOLAR ELECTRON AND PROTON SYSTEM, AND A SUPRATHERMAL ENERGETIC PARTICLE SYSTEM. THE INSTRUMENT PACKAGE HAS A MASS OF 11.7 KG, USES 8.03 W OF POWER, AND HAS A BIT RATE OF 180 BPS IN CRUISE MODE AND 360 BPS IN TRACKING MODE.

----- ISPM/NASA, STONE-----

INVESTIGATION NAME- ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (RAE)

NSSDC ID- ISPHASA-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - R.G. STONE

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (RAE) ARE (1) TO TRACK SOLAR RADIO BURSTS USING TRIANGULATION TO DETERMINE SOURCE LOCATION, (2) TO MONITOR LARGE SCALE MAGNETIC FIELD TOPOLOGY AND ELECTRON DENSITY ALONG EXCITER TRAJECTORY AS A FUNCTION OF HELIOGRAPHIC LATITUDE AND LONGITUDE, AND (3) TO DETERMINE JOVIAN RADIO SOURCE LOCATIONS. DATA ARE USED IN CONJUNCTION WITH ISPM/ESA-06 (ALSO STONE). THE INVESTIGATION USES A 100-M TIP-TO-TIP DIPOLE ANTENNA MOUNTED IN THE EQUATORIAL PLANE OF THE SPINNING SECTION AND ASSOCIATED ELECTRONICS. THE RF RECEIVER HAS A LOW PASS BAND OF 5 TO 30 KHZ AND A HIGH PASS BAND OF 30KHZ TO 1 MHZ. IT SAMPLES IN 16 CHANNELS. THE MASS OF THE INSTRUMENT IS 1.66 KG (EXCLUDING THE ANTENNA), POWER CONSUMPTION IS 1.06 W, AND THE DATA RATE IS 21.33 BPS.

***** LANDSAT-D*****

SPACECRAFT COMMON NAME- LANDSAT-D
ALTERNATE NAMES- LFO-A

NSSDC ID- LAND-D

LAUNCH DATE- 07/31/82

WEIGHT- 1407. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.3 MIN
PERIAPSIS- 705.3 KM ALT

INCLINATION- 98.2 DEG
APOAPSIS- 705.3 KM ALT

PERSONNEL
MG - H. MANNHEIMER
PM - J.R. BUSSE
PS - V.V. SALOMONSON

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT-D SYSTEM IS AN EXPERIMENTAL EARTH RESOURCES MONITORING SYSTEM WITH THE NEW POWERFUL REMOTE-SENSING CAPABILITIES OF THE THEMATIC MAPPER (TM), AND PROVIDES A TRANSITION FOR BOTH FOREIGN AND DOMESTIC USERS FROM THE MULTISPECTRAL SCANNER (MSS) DATA (WHICH IS ALSO PART OF THE INSTRUMENT PACKAGE) TO THE HIGHER RESOLUTION AND DATA RATE OF THE TM. IT HAS A COMPLETE END-TO-END HIGHLY AUTOMATED DATA SYSTEM, WHICH IS DESIGNED TO BE A NEW GENERATION SYSTEM, AND IS A MAJOR STEP FORWARD IN GLOBAL REMOTE-SENSING APPLICATIONS. THE LANDSAT-D MISSION CONSISTS OF AN ORBITING SATELLITE (SPACE SEGMENT) WITH THE NECESSARY WIDEBAND DATA LINKS AND SUPPORT SYSTEMS, AND A GROUND SEGMENT. THE LANDSAT-D SPACE SEGMENT CONSISTS OF TWO MAJOR SYSTEMS: (1) THE INSTRUMENT MODULE, CONTAINING THE INSTRUMENTS TOGETHER WITH THE MISSION UNIQUE SUBSYSTEMS, SUCH AS THE SOLAR ARRAY AND DRIVE, THE TDPS ANTENNA, THE WIDE-BAND MODULE (WBM), AND THE GLOBAL POSITIONING SYSTEM (GPS); AND (2) THE MULTIMISSION MODULAR SPACECRAFT (MMS) THAT CONTAINS THE MODULARIZED AND STANDARDIZED POWER, PROPULSION, ATTITUDE CONTROL, AND COMMUNICATIONS AND DATA HANDLING SUBSYSTEMS. WHEN THE LANDSAT-D SATELLITE IS LAUNCHED, IT WILL BE DEPLOYED AT AN ORBITAL ALTITUDE OF 705.3 KM, INCLINATION OF 98.2 DEG, AND A SUN ANGLE OF 9:30 A.M. AT THE DESCENDING NODE. THIS ORBIT HAS A FREQUENCY OF 10-9/16 ORBITS PER DAY AND COVERS THE EARTH IN 16 DAYS. THE DISTANCE BETWEEN GROUND TRACKS IS 172 KM, WHICH WHEN USED IN CONJUNCTION WITH THE 185-KM TM AND MSS SENSORS SWATH WIDTH, PROVIDES AN OVERLAP OF 7.6 PERCENT. THE SPACE SEGMENT IS DESIGNED WITH 3 YEARS NOMINAL LIFE TIME IN ORBIT AND CAN BE EXTENDED THROUGH IN-ORBIT REPLACEMENT CAPABILITY WHEN THE SHUTTLE IS OPERATIONAL. THE SPACECRAFT AND ATTENDANT SENSORS WILL BE OPERATED THROUGH THE TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS).

----- LANDSAT-D, BANKS-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- LAND-D -02

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - G.F. BANKS

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT D MULTISPECTRAL SCANNER (MSS) PROVIDES REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION IS TO PROVIDE AN ALTERNATE TO THE THEMATIC MAPPER (TM), IT PROVIDES DATA FOR AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY. THE MSS SYSTEM IS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE, FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTS OF A DOUBLE REFLECTION-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATES IN THE FOLLOWING SPECTRAL INTERVALS: BAND 1 - 0.5 TO 0.6 MICROMETERS, BAND 2 - 0.6 TO 0.7 MICROMETERS, BAND 3 - 0.7 TO 0.8 MICROMETERS, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 1.1 TO 12.6 MICROMETERS. THIS LAST BAND, WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, PROVIDES NIGHTTIME SENSING CAPABILITIES. THE LANDSAT D MSS IS SIMILAR TO THE LANDSAT 3 MSS EXCEPT FOR CHANGES NECESSARY TO ACCOMMODATE THE LOWER ORBITAL ALTITUDE. THE SWATH WIDTH OF 185 KM REMAINS THE SAME BY INCREASING THE FOV OF THE SENSORS FROM 11.56 TO 14.92 DEG. THE GROUND RESOLUTION IS 82.6 M FOR BANDS 1 THROUGH 4 AND 248 M FOR BAND 5. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE IS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL IS ACCOMPLISHED. OPTICAL FILTERS PRODUCE SPECTRAL SEPARATION. SIX DETECTORS ARE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND: BANDS 1 THROUGH 3 USE PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USES SILICON PHOTODIODES, AND BAND 5 USES MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLIER INCLUDED IN THE MSS SYSTEM PROCESSES THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA ARE TIME-MULTIPLIED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA ARE TRANSMITTED DIRECTLY TO AN ACQUISITION STATION VIA THE TDRSS. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT-D, FEINBERG-----

INVESTIGATION NAME- GLOBAL POSITIONING SYSTEM (GPS)

NSSDC ID- LAND-D -03

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL

PI - P.M. FEINBERG

NASA-GSFC

BRIEF DESCRIPTION

THE GLOBAL POSITIONING SYSTEM (GPS) IS A DEPARTMENT OF DEFENSE (DOD) PROGRAM TO PROVIDE VERY PRECISE POSITION AND TIMING INFORMATION TO A VARIETY OF USERS. THE GPS ASSEMBLY ON LANDSAT-D OPERATES IN TWO PHASES. THE FIRST PHASE (APPROXIMATELY 90 DAYS) IS AN EXPERIMENTAL ONE TO VALIDATE AND CALIBRATE THE POSITION AND TIMING INFORMATION PROVIDED BY THE GPS ASSEMBLY. THE SECOND PHASE CALLS FOR OPERATIONAL USE OF THE GPS DATA BY LANDSAT-D.

----- LANDSAT-D, WEINSTEIN-----

INVESTIGATION NAME- THEMATIC MAPPER

NSSDC ID- LAND-D -01

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL

PI - O. WEINSTEIN

NASA-GSFC

BRIEF DESCRIPTION

THE THEMATIC MAPPER (TM) IS A SEVEN-BAND, EARTH-LOOKING, SCANNING RADIOMETER WITH A 30-M GROUND ELEMENT RESOLUTION COVERING A 185-KM GROUND SWATH FROM A 705-KM ALTITUDE. THE INSTRUMENT CONSISTS OF PRIMARY IMAGING OPTICS, SCANNING MECHANISM, SPECTRAL BAND DISCRIMINATION OPTICS, DETECTOR ARRAYS, RADIATIVE COOLER, IN-FLIGHT CALIBRATOR, AND REQUIRED OPERATING AND PROCESSING ELECTRONICS. THE SCANNING MECHANISM PROVIDES THE CROSS-TRACK SCAN, WHILE THE PROGRESS OF THE SPACECRAFT PROVIDES THE SCAN ALONG THE TRACK. THE OPTICAL SYSTEM IMAGES THE EARTH'S SURFACE ON A FIELD STOP OR A DETECTOR SIZED TO DEFINE AN AREA ON THE EARTH'S SURFACE 30 M SQ. SEVERAL LINES ARE SCANNED SIMULTANEOUSLY TO PERMIT SUITABLE DWELL TIME FOR EACH RESOLUTION ELEMENT. THE VARIATION IN RADIANT FLUX PASSING THROUGH THE FIELD STOP ONTO THE PHOTO AND THERMAL DETECTORS CREATES AN ELECTRICAL OUTPUT THAT REPRESENTS THE RADIANT HISTORY OF THE LINE. SEVEN SPECTRAL BANDS ARE USED TO PROVIDE THE SPECTRAL SIGNATURE CAPABILITY OF THE INSTRUMENT. THE INFORMATION OUTPUTS FROM THE DETECTOR CHANNELS ARE PROCESSED IN THE TM MULTIPLEXER FOR TRANSMISSION VIA THE TRACKING AND DATA RELAY SATELLITES (TDRS) AND/OR DIRECT READOUT TO LOCAL RECEIVING STATIONS.

***** LANDSAT-D1*****

SPACECRAFT COMMON NAME- LANDSAT-D1
ALTERNATE NAMES- LAND SATELLITE-E

NSSDC ID- LAND-E

LAUNCH DATE- 06/08/85 WEIGHT- 1407. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.3 MIN
PERIAPSIS- 705.3 KM ALT

INCLINATION- 98.2 DEG
APOAPSIS- 705.3 KM ALT

PERSONNEL

MG - H. MANNHEIMER
PM - J.R. BUSSE
PS - V.V. SALOMONSON

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT-E SYSTEM IS AN EXPERIMENTAL EARTH RESOURCES MONITORING SYSTEM WITH THE NEW POWERFUL REMOTE SENSING CAPABILITIES OF THE THEMATIC MAPPER (TM), AND PROVIDES A TRANSITION FOR BOTH FOREIGN AND DOMESTIC USERS FROM THE MULTISPECTRAL SCANNER (MSS) DATA (WHICH IS ALSO PART OF THE INSTRUMENT PACKAGE) TO THE HIGHER RESOLUTION AND DATA RATE OF THE TM. IT HAS A COMPLETE END-TO-END HIGHLY AUTOMATED DATA SYSTEM, WHICH IS DESIGNED TO BE A NEW GENERATION SYSTEM, AND IS A MAJOR STEP FORWARD IN GLOBAL REMOTE-SENSING APPLICATIONS. THE LANDSAT-E MISSION CONSISTS OF AN ORBITING SATELLITE (SPACE SEGMENT) WITH THE NECESSARY WIDEBAND DATA LINKS AND SUPPORT SYSTEMS, AND A GROUND SEGMENT. THE LANDSAT-E SPACE SEGMENT CONSISTS OF TWO MAJOR SYSTEMS: (1) THE INSTRUMENT MODULE, CONTAINING THE INSTRUMENTS TOGETHER WITH THE MISSION UNIQUE SUBSYSTEMS, SUCH AS THE SOLAR ARRAY AND DRIVE, THE TDPS ANTENNA, THE WIDE-BAND MODULE (WBM), AND THE GLOBAL POSITIONING SYSTEM (GPS); AND (2) THE MULTIMISSION MODULAR SPACECRAFT (MMS) THAT CONTAINS THE MODULARIZED AND STANDARDIZED POWER,

PROPULSION, ATTITUDE CONTROL, AND COMMUNICATIONS AND DATA HANDLING SUBSYSTEMS. WHEN THE LANDSAT-E SATELLITE IS LAUNCHED, IT WILL BE DEPLOYED AT AN ORBITAL ALTITUDE OF 705.3 KM, INCLINATION OF 98.2 DEG, AND A SUN ANGLE OF 9:30 A.M. AT THE DESCENDING NODE. THIS ORBIT HAS A FREQUENCY OF 19-9/16 ORBITS PER DAY AND COVERS THE EARTH IN 16 DAYS. THE DISTANCE BETWEEN GROUND TRACKS IS 172 KM, WHICH WHEN USED IN CONJUNCTION WITH THE 185 KM TM AND MSS SENSORS SWATH WIDTH, PROVIDES AN OVERLAP OF 7.6 PERCENT. THE SPACE SEGMENT IS DESIGNED WITH 3 YEARS NOMINAL LIFETIME IN ORBIT AND CAN BE EXTENDED THROUGH IN-ORBIT REPLACEMENT CAPABILITY WHEN THE SHUTTLE IS OPERATIONAL. THE SPACECRAFT AND ATTENDANT SENSORS WILL BE OPERATED THROUGH THE TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS).

----- LANDSAT-D1, BANKS-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- LAND-E -02 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - G.F. BANKS NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT E MULTISPECTRAL SCANNER (MSS) PROVIDES REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION IS TO PROVIDE AN ALTERNATE TO THE THEMATIC MAPPER (TM), IT PROVIDES DATA FOR AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY. THE MSS SYSTEM IS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTS OF A DOUBLE REFLECTION-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATES IN THE FOLLOWING SPECTRAL INTERVALS: BAND 1 - 0.5 TO 0.6 MICROMETERS, BAND 2 - 0.6 TO 0.7 MICROMETERS, BAND 3 - 0.7 TO 0.8 MICROMETERS, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND, WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, PROVIDES NIGHTTIME SENSING CAPABILITIES. THE LANDSAT E MSS IS SIMILAR TO THE LANDSAT 3 MSS EXCEPT FOR CHANGES NECESSARY TO ACCOMMODATE THE LOWER ORBITAL ALTITUDE. THE SWATH WIDTH OF 185 KM WILL REMAIN THE SAME BY INCREASING THE FOV OF THE SENSORS FROM 11.56 TO 14.92 DEG. THE GROUND RESOLUTION WILL BE 82.6 M FOR BANDS 1 THROUGH 4 AND 248 M FOR BAND 5. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE IS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL IS ACCOMPLISHED. OPTICAL FILTERS PRODUCE SPECTRAL SEPARATION. SIX DETECTORS ARE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND; BANDS 1 THROUGH 3 USE PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USES SILICON PHOTODIODES, AND BAND 5 USES MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSES THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA ARE TIME-MULTIPLEXED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA ARE TRANSMITTED DIRECTLY TO AN ACQUISITION STATION VIA THE TDRSS. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT-D1, FEINBERG-----

INVESTIGATION NAME- GLOBAL POSITIONING SYSTEM (GPS)

NSSDC ID- LAND-E -03 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - P.M. FEINBERG NASA-GSFC

BRIEF DESCRIPTION
THE GLOBAL POSITIONING SYSTEM (GPS) IS A DEPARTMENT OF DEFENSE (DOD) PROGRAM TO PROVIDE VERY PRECISE POSITION AND TIMING INFORMATION TO A VARIETY OF USERS. THE GPS ASSEMBLY ON LANDSAT-E OPERATES IN TWO PHASES. THE FIRST PHASE (APPROXIMATELY 90 DAYS) IS AN EXPERIMENTAL ONE TO VALIDATE AND CALIBRATE THE POSITION AND TIMING INFORMATION PROVIDED BY THE GPS ASSEMBLY. THE SECOND PHASE CALLS FOR OPERATIONAL USE OF THE GPS DATA BY LANDSAT-D.

----- LANDSAT-D1, WEINSTEIN-----

INVESTIGATION NAME- THEMATIC MAPPER

NSSDC ID- LAND-E -01 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - O. WEINSTEIN NASA-GSFC

BRIEF DESCRIPTION
THE THEMATIC MAPPER (TM) IS A SEVEN-BAND, EARTH-LOOKING, SCANNING RADIOMETER WITH A 30-M GROUND ELEMENT RESOLUTION COVERING A 185-KM GROUND SWATH FROM A 705-KM ALTITUDE. THE INSTRUMENT CONSISTS OF PRIMARY IMAGING OPTICS, SCANNING MECHANISM, SPECTRAL BAND DISCRIMINATION OPTICS, DETECTOR ARRAYS, RADIATIVE COOLER, IN-FLIGHT CALIBRATOR, AND REQUIRED OPERATING AND PROCESSING ELECTRONICS. THE SCANNING MECHANISM PROVIDES THE CROSS-TRACK SCAN WHILE THE PROGRESS OF THE SPACECRAFT PROVIDES THE SCAN ALONG THE TRACK. THE OPTICAL SYSTEM IMAGES THE EARTH'S SURFACE ON A FIELD STOP OR A DETECTOR SIZED TO DEFINE AN AREA ON THE EARTH'S SURFACE 30-M SQ. SEVERAL LINES ARE SCANNED SIMULTANEOUSLY TO PERMIT SUITABLE DWELL TIME FOR EACH RESOLUTION ELEMENT. THE VARIATION IN RADIANT FLUX PASSING THROUGH THE FIELD STOP ONTO THE PHOTO AND THERMAL DETECTORS CREATES AN ELECTRICAL OUTPUT THAT REPRESENTS THE RADIANT HISTORY OF THE LINE. SEVEN SPECTRAL BANDS ARE USED TO PROVIDE THE SPECTRAL SIGNATURE CAPABILITY OF THE INSTRUMENT. THE INFORMATION OUTPUTS FROM THE DETECTOR CHANNELS ARE PROCESSED IN THE TM MULTIPLEXER FOR TRANSMISSION VIA THE TRACKING AND DATA RELAY SATELLITES (TDRS) AND/OR DIRECT READOUT TO LOCAL RECEIVING STATIONS.

***** NOAA-D*****

SPACECRAFT COMMON NAME- NOAA-D
ALTERNATE NAMES-

NSSDC ID- NOAA-D

LAUNCH DATE- 09/15/81 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-MESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
MG - R.J. ARNOLD NA-4 HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION
NOAA-D IS THE FOURTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY-HIGH-RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 50 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-D, MESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-D -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - MESS STAFF NOAA-MESS

BRIEF DESCRIPTION

THE NOAA-D ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR-IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR-WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4-KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1-KM) RESOLUTION VIA HIGH-RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1-KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-D -02

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBSINVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-D OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-D -03

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBSINVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-D IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-D -04

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRONMENT MONITORINGINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS

O1 - M.H. SAUER

O1 - C.O. BOSTROM

NOAA-ERL

NOAA-ERL

APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR-PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES, BOTH PROTONS BETWEEN 150 KEV AND 40 MEV, AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-E*****

SPACECRAFT COMMON NAME- NOAA-E
ALTERNATE NAMES-

NSSDC ID- NOAA-E

LAUNCH DATE- 04/15/83

WEIGHT- 588.9 KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY

UNITED STATES

NOAA-NESS

UNITED STATES

NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 101.5 MIN

INCLINATION- 98.7 DEG

PERIAPSIS- 833. KM ALT

APOAPSIS- 833. KM ALT

PERSONNEL

MG - R.J. ARNOLD

PM - G.A. BRANCHFLOWER

PS - A. ARKING

NASA HEADQUARTERS

NASA-GSFC

NASA-GSFC

BRIEF DESCRIPTION

NOAA-E IS THE FIFTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER-VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-E -01

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBSINVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-E ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING

SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR-IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.95 TO 3.95 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT), AND AT HIGH (1 KM) RESOLUTION VIA HIGH-RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA (A 4 KM RESOLUTION) AND LOCAL AREA COVERAGE (LAC) DATA FROM SELECTED PORTIONS OF EACH ORBIT (1-KM RESOLUTION). IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-E -02 INVESTIGATIVE PROGRAM
CODE EO/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-E OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50- TO 60-GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES, UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN, WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-E -03 INVESTIGATIVE PROGRAM
CODE EO/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-E IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-E -04 INVESTIGATIVE PROGRAM
CODE EO/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS
OI - M.H. SAUER
OI - C.U. BOSTROM

NOAA-ERL
NOAA-ERL
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/M AND 25 MEV/M. THERE ARE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV; ELECTRONS ABOVE 140 KEV; AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/M. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-F*****

SPACECRAFT COMMON NAME- NOAA-F
ALTERNATE NAMES-

NSSDC ID- NOAA-F

LAUNCH DATE- 09/15/83 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
MG - R.J. ARNOLD NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-F IS THE SIXTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1979-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER, AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGHOUT THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-F, BROOME-----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- NOAA-F -05 INVESTIGATIVE PROGRAM
CODE EO/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
TL - G.C. BROOME NASA-LARC
TM - A.A. RUDMANN NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBSS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBSS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE-CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIRED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE

FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 177 DEG FOR TIROS-N AND 135 DEG FOR ERBS-A. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.8 MICROMETERS TO OVER 50 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH A 45-DEG FIELD OF VIEW FOR TIROS-N AND 88 DEG FOR ERBS-A, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW, MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL-SPATIAL-RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.22 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-F -01 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-F ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA (A 4 KM RESOLUTION) AND LOCAL AREA COVERAGE (LAC) DATA FROM SELECTED PORTIONS OF EACH ORBIT (1 KM RESOLUTION). IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-F -02 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-F OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50- TO 60-GHZ OXYGEN BAND (50.3, 53.7, 55.8, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING

DEVICES, UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN, WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-F -03 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-F IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-F -04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
O1 - M.H. SAUER NOAA-ERL
O2 - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES, IN FIVE ENERGY RANGES, BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/H AND 25 MEV/H. THERE ARE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV; ELECTRONS ABOVE 140 KEV; AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/H. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-G*****

SPACECRAFT COMMON NAME- NOAA-G
ALTERNATE NAMES-

NSSDC ID- NOAA-G

LAUNCH DATE- 04/15/85 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIC- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
RG - R.J. ARNOLD NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION
NOAA-G IS THE SEVENTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMIC AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS

INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS, VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 30 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/SEC.

----- NOAA-G, BROOME-----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- NOAA-G -05

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.C. BROOME
TR - A.A. RUDMANN

NASA-LARC
NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBSS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUAT; TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 177 DEG FOR TIROS-N AND 135 DEG FOR ERBS-A. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES, VARYING FROM 0.2 MICROMETERS TO OVER 50 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH A 66-DEG FIELD OF VIEW FOR TIROS-N AND 88 DEG FOR ERBS-A, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW, MEASURING THE TOTAL SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS. (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.2 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-G -01

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-G ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA-SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 1.225 MICROMETER TO DETECTOR CUTOFF AROUND 1.5 MICROMETER, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETER, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETER. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1

KM, AND THE TWO IR-WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME AND DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4-KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1-KM) RESOLUTION VIA HIGH-RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA (4-KM RESOLUTION) AND LOCAL AREA COVERAGE (LAC) DATA, WHICH WILL CONTAIN DATA FROM SELECTED PORTIONS OF EACH ORBIT (1-KM RESOLUTION). IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-G -02

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-G OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7 MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3 MICROMETER CARBON DIOXIDE BAND, CHANNEL 3 - THE 9.7 MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1 MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15 MICROMETER CARBON DIOXIDE BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18 TO 30 MICROMETER ROTATIONAL WATER VAPOR BANDS (18.0, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION, PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES, UTILIZING A STEP SCAN TO PROVIDE A TRAVERSE SCAN, WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-G -03

INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-G IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW-DUTY-CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-G -04

INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - H.W. SAUER
OI - C.O. BOSTROM

NOAA-ERL
NOAA-ERL
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/M AND 25 MEV/M. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV; ELECTRONS ABOVE 140 KEV; AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWING IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/M. THE TOTAL-ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** OSS-1*****

SPACECRAFT COMMON NAME- OSS-1
ALTERNATE NAMES- SHUTTLE OFT-4

NSSDC ID- SHOFT-4

LAUNCH DATE- 04/30/82 WEIGHT- 3730. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLIN'-10N- 48.3 DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 300. KM ALT

PERSONNEL
MM - K. KISSIN NASA-GSFC
MS - W.M. NEUPERT NASA-GSFC

BRIEF DESCRIPTION

THE EXPERIMENTS SELECTED TO BE PART OF THE OSS-1 PAYLOAD HAVE SEVERAL OBJECTIVES WHICH INCLUDE THE FOLLOWING: TO CONDUCT SUPPLEMENTARY OBSERVATIONS OF THE ORBITER'S ENVIRONMENT THAT HAVE SPECIFIC APPLICABILITY TO PLASMA PHYSICS AND ASTRONOMICAL PAYLOADS; TO CONDUCT SCIENTIFIC OBSERVATIONS THAT DEMONSTRATE THE SPACE SHUTTLE'S RESEARCH CAPABILITIES AND ARE APPROPRIATE FOR FLIGHT ON AN EARLY MISSION; AND TO EVALUATE TECHNOLOGY THAT MAY HAVE APPLICATION IN FUTURE EXPERIMENTS IN SPACE. SIX OF THE SEVEN EXPERIMENTS THAT MAKE UP THE OSS-1 PAYLOAD, OSS-1-01 TO OSS-1-06, ARE MOUNTED ON THE SPACELAB PALLET AND THE SEVENTH EXPERIMENT, OSS-1-07, IS MOUNTED IN THE MID DECK DIRECTLY BELOW THE ORBITER CABIN. THE SPACELAB PALLET IS TRANSPORTED TO AND FROM ORBIT IN THE CARGO BAY OF THE SPACE SHUTTLE ORBITER, AND REMAINS THERE THROUGHOUT THE 7-DAY FLIGHT. THE PARAMETERS MEASURED BY THE PAYLOAD INCLUDE (1) PLASMA, WAVES, AND FIELDS THAT EXIST IN THE AMBIENT ATMOSPHERE, THAT RESULT FROM PERTURBATIONS INDUCED BY THE MOTION OF THE ORBITER THROUGH THE MAGNETIZED PLASMA, AND THAT RESULT FROM 'INTERFERENCE' BECAUSE OF THE ORBITER/SPACELAB OPERATIONS SYSTEMS; (2) POLARIZATION IN SOLAR X-RAY BURSTS; (3) SOLAR FLUX IN THE WAVELENGTH RANGE 120-400 NANOMETERS; (4) ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE; (5) THERMAL PROPERTIES OF THE CANISTER EXPERIMENT; AND (6) OPTICAL PROPERTIES OF THE SHUTTLE-INDUCED ATMOSPHERES. IN ADDITION, THERE ARE MEASUREMENTS OF THE INFLUENCE OF WEIGHTLESSNESS ON THE LIGNIFICATION IN DEVELOPING PLANT SEEDLINGS. AN INDUCED ENVIRONMENT CONTAMINATION MONITOR (IECH), DESIGNED AND PROVIDED BY THE MSFC, IS AN ENGINEERING PACKAGE FLOWN ON THE ORBITAL TEST FLIGHTS (OFTS) TO PROVIDE VERIFICATION MEASUREMENTS OF PARTICLES AND GASES DURING GROUND OPERATIONS, ASCENT, ON-ORBIT DESCENT, AND POST LANDING. IT CONTAINS A HUMIDITY MONITOR, DEW POINT HYGROMETER, AIR SAMPLER, CASCADE IMPACTOR, PASSIVE SAMPLE ARRAY, OPTICAL EFFECTS MODULE, TEMPERATURE-CONTROLLED QUARTZ CRYSTAL MICROBALANCE, CRYOGENIC QUARTZ CRYSTAL MICROBALANCE, CAMERA/PHOTOMETER, AND A MASS SPECTROMETER.

***** OSS-1, BANKS*****

INVESTIGATION NAME- VEHICLE CHARGING AND POTENTIAL
EXPERIMENT

NSSDC ID- SHOFT-4-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
PARTICLES AND FIELDS

PERSONNEL
PI - P.M. BANKS STANFORD U
OI - W.J. RAITT UTAH STATE U
OI - P.R. WILLIAMSON UTAH STATE U
OI - R.M. GOLDSTEIN NASA-JPL
OI - U. SARIN U OF MICHIGAN

BRIEF DESCRIPTION

THE OBJECTIVES OF THE VEHICLE CHARGING AND POTENTIAL EXPERIMENT ARE (1) TO DETERMINE ELECTRIC POTENTIAL CHANGES ASSOCIATED WITH ORBITER AND EXPERIMENT OPERATION, (2) TO DETERMINE THE ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE, (3) TO DETERMINE ELECTRIC POTENTIAL CHANGES ARISING FROM ACTIVE ELECTRON EMISSION, (4) TO DETERMINE ELECTRICAL PROCESSES ASSOCIATED WITH CHARGING AND DISCHARGING OF VEHICLE DIELECTRIC SURFACES, (5) TO ASSESS THE ELECTRICAL RESPONSE OF THE VEHICLE TO LOW LEVELS OF ELECTRON EMISSION, (6) TO DOCUMENT THE OPERATION OF A LOW-POWER ELECTRON ACCELERATOR IN THE ORBITER ENVIRONMENT, AND (7) TO EVALUATE THE SUITABILITY OF THE ORBITER BAY FOR IN SITU PLASMA MEASUREMENTS. TO ACHIEVE THESE OBJECTIVES, THE FOLLOWING INSTRUMENTS ARE FLOWN: (1) TWO CHARGE AND CURRENT PROBES (CCP) TO MEASURE VEHICLE RETURN CURRENTS AND DIELECTRIC CHARGES AT TWO LOCATIONS IN THE BAY, (2) SPHERICAL RETARDING POTENTIAL ANALYZER/LANGMUIR PROBE (SRPA/LP) TO MEASURE VEHICLE POTENTIAL RELATIVE TO THE PLASMA, ELECTRON DENSITY, AND PLASMA TEMPERATURE; AND (3) A FAST PULSE ELECTRON GUN (FPEG) TO PROVIDE ELECTRON EMISSION WITH SHORT (200-500-PICOSECOND) PULSES. THE GUN IS CAPABLE OF DC OPERATION FOR EXTENDED PERIODS OF TIME, AND OPERATES ON A CURRENT OF 0.1 AMP AND A VOLTAGE OF 1 KV.

***** OSS-1, BRUECKNER*****

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE
MONITOR

NSSDC ID- SHOFT-4-03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE US NAVAL RESEARCH LAB
OI - D.K. PRINZ US NAVAL RESEARCH LAB
OI - M.E. VAN HOOSIER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THE 'SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR' EXPERIMENT ARE (1) TO MEASURE THE INTENSITY OF THE SOLAR ULTRAVIOLET CONTINUUM AT 180 NANOMETERS RELATIVE TO ITS INTENSITY AT 210 NANOMETERS WITH AN ACCURACY OF PLUS OR MINUS 1 PERCENT, (2) TO MEASURE THE RELATIVE SPECTRAL DISTRIBUTION OF THE SOLAR RADIANCE THROUGHOUT THE SPECTRAL REGION FROM 120 TO 400 NANOMETERS WITH AN ACCURACY OF 1 TO 5 PERCENT (DEPENDENT ON WAVELENGTH) USING A SINGLE INSTRUMENT, (3) TO MEASURE THE ABSOLUTE INTENSITY OF THE SOLAR SPECTRUM BETWEEN 120 TO 400 NANOMETERS WITH AN ABSOLUTE ACCURACY OF 4 TO 10 PERCENT, DEPENDING ON WAVELENGTH, AND TIE INTO HIGH-ACCURACY GROUND-BASED MEASUREMENTS ABOVE 300 NANOMETERS, AND (4) TO SEARCH FOR VARIABILITY OF THE SOLAR CONTINUUM AND EMISSION LINES ATTRIBUTABLE TO CHANGING LEVELS OF SOLAR ACTIVITY. THE INSTRUMENTATION CONSISTS OF TWO DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AN ULTRAVIOLET CALIBRATION SOURCE, AND A SOLAR POINTING ERROR SENSOR. THE SPECTROMETERS ARE SUN-POINTED AND HAVE A PLUS OR MINUS 0.5 DEG FIELD OF VIEW. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY DURING THE DAYLIGHT PORTION OF EACH SOLAR-POINTED ORBIT TO MEASURE THE SHORT TIME VARIATIONS OF THE SOLAR ULTRAVIOLET FLUX. THE SECOND SPECTROMETER IS USED ONLY ONCE A DAY TO TRACK ANY CHANGE IN SENSITIVITY OF THE FIRST SPECTROMETER. SIMILARLY, TWO OF THE FIVE PHOTODIODES ARE USED ONLY ONCE A DAY. A DEUTERIUM LAMP IS USED AS THE TRANSFER STANDARD SOURCE FOR DAILY IN-FLIGHT CALIBRATION AND STABILITY TRACKING OF BOTH SPECTROMETERS AND ALL SEVEN DETECTORS.

***** OSS-1, COWLES*****

INVESTIGATION NAME- INFLUENCE OF WEIGHTLESSNESS IN
LIGNIFICATION OF PLANT SEEDLINGS

NSSDC ID- SHOFT-4-07 INVESTIGATIVE PROGRAM
CODE D

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - J.R. COWLES U OF HOUSTON
OI - M.W. SCHELD U OF HOUSTON

BRIEF DESCRIPTION

AN OBJECTIVE OF THE STUDY OF INFLUENCE OF WEIGHTLESSNESS ON LIGNIFICATION IN DEVELOPING PLANT SEEDLINGS EXPERIMENT IS TO USE THE FLIGHT DATA TO PROVIDE CONFIRMATION OR REJECTION OF THE HYPOTHESIS THAT GRAVITY EXERTS A POSITIVE CONTROL UPON THE PATHWAY OF LIGNIFICATION, AND THAT THERE IS A SYNERGISTIC INTERACTION WITH THE ATMOSPHERE. A SERIES OF COMPLEMENTARY EXPERIMENTS WITH PASSIVE EXPOSURE OF COMPACT PLANT SYSTEMS IN A SMALL GROWTH CHAMBER ARE FLOWN. MEASUREMENTS ARE MADE OF LIGNIFICATION AND ASSOCIATED ENZYMES, AND OF GASEOUS METABOLITES. THE EXPERIMENT PROVIDES EXPERIENCE WITH, AND DEVELOPMENT OF TECHNIQUES AND HARDWARE FOR PLANT HANDLING IN SPACE.

----- OSS-1, McDONNELL-----

INVESTIGATION NAME- MICROABRASION FOIL

NSDDC ID- SHOFT-4-08

INVESTIGATIVE PROGRAM
CODE SL/CO-0P

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.A.McDONNELL

U OF KENT

BRIEF DESCRIPTION

THIS COSMIC DUST EXPERIMENT IS FLOWN TO MEASURE THE FLUX OF SMALL MICROMETEORIDS IN CISMAR (NEAR-EARTH) SPACE. THE EXPERIMENT WILL MEASURE THE FLUX OF MICROMETEORIDS FOR PARTICLES HAVING MASSES GREATER THAN $1.E-8$ G; VELOCITY OF INCIDENT PARTICLES BY OBSERVATION OF THEIR CHARACTERISTIC PENETRATION PROFILE; DENSITY OF INCIDENT PARTICLES BY UTILIZING A "METEOR BUMPER" TECHNIQUE; AND CHEMICAL PROPERTIES OF INCIDENT PARTICLES FROM ANALYSIS OF IMPACT DEBRIS.

----- OSS-1, NOVICK-----

INVESTIGATION NAME- SOLAR FLARE X-RAY POLARIMETER EXPERIMENT

NSDDC ID- SHOFT-4-02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - R. NOVICK
OI - G.A. CHANAN

COLUMBIA U
COLUMBIA U

BRIEF DESCRIPTION

THE OBJECTIVES OF THE SOLAR FLARE X-RAY POLARIMETER EXPERIMENT ARE TO MEASURE (1) THE DEGREE OF POLARIZATION IN SOLAR X-RAY BURSTS, (2) TEMPORAL DEPENDENCE OF THE X-RAY POLARIZATION, (3) ENERGY DEPENDENCE OF THE X-RAY POLARIZATION, (4) POLARIZATION ANGLE OF THE X-RAY EMISSION, AND (5) SOLAR X-RAY FLARE EMISSION BETWEEN 5 AND 30 KEV. IN ADDITION, THE CORRELATION OF THE X-RAY POLARIZATION WITH OTHER PHENOMENA ASSOCIATED WITH SOLAR FLARES IS STUDIED, AND THE SYSTEMATIC EFFECTS OF THE OPERATION OF THE INSTRUMENT IN A SATELLITE ENVIRONMENT IS EVALUATED. THE FLIGHT INSTRUMENT, A SCATTER BLOCK POLARIMETER, CONSISTS OF THREE DETECTORS MOUNTED IN AN EQUILATERAL CONFIGURATION. THERE ARE FOUR COUNTERS AND FOUR RECTANGULAR LITHIUM SCATTERING BLOCKS PER DETECTOR. THE POLARIMETER IS POINTED AT THE SUN DURING THE OCCURRENCE OF SOLAR FLARES AND WHEN SUN-POINTED IT HAS A 3-DEG FIELD OF VIEW. THE INSTRUMENT USES THE ANGULAR DEPENDENCE OF THE INCOMERENT SCATTERING CROSS SECTION OF ELECTRONS TO DETECT THE DIRECTION OF THE ELECTRIC VECTOR OF THE INCIDENT PHOTON. THE DIFFERENCE IN COUNTING RATES IN DETECTORS AT DIFFERENT AZIMUTHS RELATIVE TO THE EARTH-SUN LINE IS THE SIGNATURE OF THE X-RAY POLARIZATION.

----- OSS-1, OLLENDORF-----

INVESTIGATION NAME- THERMAL CANISTER EXPERIMENT

NSDDC ID- SHOFT-4-05

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - S. OLLENDORF

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE THERMAL CANISTER EXPERIMENT ARE (1) TO DEMONSTRATE UNDER THE DIVERSE THERMAL ENVIRONMENTS OF THE SPACE SHUTTLE THE PERFORMANCE OF A THERMAL CANISTER UTILIZING FEEDBACK VARIABLE-CONDUCTANCE HEATPIPES, AND (2) TO DEMONSTRATE THE ABILITY OF THE SYSTEM TO MAINTAIN TEMPERATURE CONTROL WITHIN NARROW LIMITS BY VARYING INTERNAL POWER DISSIPATION OVER A WIDE RANGE AND MONITORING THERMAL BEHAVIOR. TO ACHIEVE THESE OBJECTIVES, A CANISTER MEASURING $1 \text{ M} \times 1 \text{ M} \times 3 \text{ M}$ AND WEIGHING 160 KG, FIXED CONDUCTANCE CANISTER HEAT PIPES, VARIABLE CONDUCTANCE HEAT PIPES, A RADIATOR AND RADIATOR HEAT PIPES, CONTROL ELECTRONICS AND DATA ACQUISITION AND COMMAND SYSTEM, AND SIMULATED INSTRUMENT HEAT LOADS (HEATERS) WITHIN THE CANISTER ARE FLOWN. THE THERMAL CANISTER IS BUILT IN AS CLOSE A CONFIGURATION AS POSSIBLE TO THE FLIGHT APPLICATION AND MOUNTED ON A STRUCTURE TOGETHER WITH SUPPORT ELECTRONICS. HEATERS WITHIN THE CANISTER SIMULATE INSTRUMENT POWER DISSIPATION. CANISTERS DEVELOPED FOR FLIGHT INSTRUMENTS ARE A STANDARD INVENTORY ITEM FOR FUTURE USE AS REQUIRED.

----- OSS-1, SHAWHAN-----

INVESTIGATION NAME- PLASMA DIAGNOSTIC PACKAGE

NSDDC ID- SHOFT-4-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMA
PARTICLES AND FIELDS

PERSONNEL

PI - S.D. SHAWHAN
OI - L.A. FRANK
OI - D.A. GURNEY
OI - W. D'ANGELO
OI - H.C. BRINTON
OI - D.L. PEASNER
OI - W. STONE

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NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE PLASMA DIAGNOSTIC PACKAGE (PDP) EXPERIMENT ARE (1) TO STUDY THE ORBITER-MAGNETOPLASMA INTERACTIONS, (2) TO MAP THE LOCALIZED SOURCES OF ELECTRIC AND MAGNETIC FIELDS, (3) TO DEMONSTRATE THE OPERATION OF THE PDP PRIOR TO ITS FLIGHT ON SPACELAB 2, AND (4) TO DETERMINE THE CHARACTERISTICS OF THE ELECTRON BEAM EMITTED FROM THE FAST-PULSE ELECTRON GUN (FPEG) OF EXPERIMENT SHOFT-4-04. SPECIFICALLY, THE PDP MEASURES THE PLASMA, WAVES, AND FIELDS THAT EXIST IN THE AMBIENT IONOSPHERE, THAT RESULT FROM THE PERTURBATIONS INDUCED BY THE MOTION OF THE ORBITER THROUGH THE MAGNETIZED PLASMA, AND THAT RESULT FROM 'INTERFERENCE' BECAUSE OF THE ORBITER/SPACELAB OPERATION SYSTEM. THE ELECTROMAGNETIC INTERFERENCE AND PLASMA CONTAMINATION WITHIN THE ORBITER BAY ARE MAPPED BY USING THE REMOTE MANIPULATOR ARM TO SCAN THE PDP OVER THE BAY AREA. THE FOLLOWING INSTRUMENTS MAKE UP THE PDP: A LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEDEA) TO MEASURE NONTHERMAL ELECTRON AND ION ENERGY SPECTRA AND PITCH ANGLE DISTRIBUTIONS FOR PARTICLE ENERGIES BETWEEN 2 EV AND 50 KEV, AN AC MAGNETIC WAVE SEARCH COIL SENSOR TO MEASURE MAGNETIC FIELDS WITH A FREQUENCY RANGE OF 10 HZ TO 30 KHZ, AC ELECTRIC AND ELECTROSTATIC WAVE ANALYZERS TO MEASURE ELECTRIC FIELDS WITH A FREQUENCY RANGE OF 10 HZ TO 1 GHZ, A DC ELECTROSTATIC DOUBLE PROBE WITH SPHERICAL SENSORS TO MEASURE ELECTRIC FIELDS IN ONE AXIS FROM 2 MV/M TO 2 V/M, A DC TRIAXIAL FLUXGATE MAGNETOMETER TO MEASURE MAGNETIC FIELDS FROM 12 MILLIGAUSS TO 1.5 GAUSS, A LANGMUIR PROBE TO MEASURE THERMAL ELECTRON DENSITIES BETWEEN $10.F4$ AND $10.E7$ PER CUBIC CM AND DENSITY IRREGULARITIES WITH $10.M$ TO $10.KM$ SCALE SIZE, A RETARDING POTENTIAL ANALYZER/DIFFERENTIAL VELOCITY PROBE TO MEASURE ION NUMBER DENSITY FROM $10.E2$ TO $10.E7$ PER CUBIC CM, THE ENERGY DISTRIBUTION FUNCTION BELOW 16 EV, AND DIRECTED ION VELOCITIES UP TO 15 KM/SEC, AN ION MASS SPECTROMETER TO MEASURE ION DENSITIES FROM 20 TO 2.E7 IONS PER CUBIC CM IN THE MASS RANGE FROM 1 TO 64 AMU, AND A PRESSURE GAUGE TO MEASURE AMBIENT PRESSURE FROM $10.E-3$ TO $10.E-7$ TORR.

----- OSS-1, TRIOLO-----

INVESTIGATION NAME- CONTAMINATION MONITOR

NSDDC ID- SHOFT-4-09

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
DUST
TECHNOLOGY

PERSONNEL

PI - J.J. TRIOLO

NASA-GSFC

BRIEF DESCRIPTION

THE CONTAMINATION MONITOR MEASURES MASS ACCRETION EMANATING FROM SOURCES ON AND AROUND OSS-1 PALLET. QUARTZ CRYSTAL MICROBALANCES (QCM) VIEW ORTHOGONALLY IN THREE DIRECTIONS AND AT 45 DEG IN ONE DIRECTION. THERE IS NO CREW INVOLVEMENT.

----- OSS-1, WEINBERG-----

INVESTIGATION NAME- CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE

NSDDC ID- SHOFT-4-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.L. WEINBERG
OI - D.W. SCHUERMAN
OI - F. GIOVANE

U OF FLORIDA
U OF FLORIDA
U OF FLORIDA

BRIEF DESCRIPTION

THE OBJECTIVES OF THE CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE EXPERIMENT ARE (1) TO DETERMINE THE OPTICAL PROPERTIES OF THE SHUTTLE-INDUCED ATMOSPHERES, (2) TO OBSERVE THE DIFFUSE ASTRONOMICAL BACKGROUND, AND (3) TO OBSERVE THE EARTH'S LIND IN THE STUDY OF ATMOSPHERIC AEROSOLS. THE EXISTING SKYLAB PHOTOMETER/CAMERA SYSTEM ADAPTED TO BE PALLET-MOUNTED IS USED. THE PHOTOELECTRIC POLARIMETER MEASURES INTENSITY AND POLARIZATION OF SKY BRIGHTNESS IN 18 COLORS BETWEEN 400 AND 820 NANOMETERS. IT HAS A SELF-CONTAINED POINTING SYSTEM, AND AUTOMATIC SHUTDOWN AND START-UP PROVISIONS TO ALLOW MAXIMUM VIEWING TIME. THE INSTRUMENT CAN BE PROGRAMMED TO DO A 4-KY SURVEY IN SEVERAL MODES. THE EXPERIMENT

CYCLE IS SELECTABLE THROUGH AN AUTOMATIC PROGRAMMER.

***** OSTA-1*****

SPACECRAFT COMMON NAME- OSTA-1
ALTERNATE NAMES- SHUTTLE OFT-2

NSSDC ID- OSTA-1

LAUNCH DATE- 10/30/81 WEIGHT- 2542. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90.0 MIN INCLINATION- 40.3 DEG
PERIAPSIS- 270. KM ALT APOAPSIS- 270. KM ALT

PERSONNEL
PM - G.S. LUNNEY NASA-JSC

BRIEF DESCRIPTION

OSTA-1 (OFFICE OF SPACE AND TERRESTRIAL APPLICATIONS -1) WILL BE THE FIRST SCIENCE AND APPLICATIONS PAYLOAD CARRIED BY THE SPACE SHUTTLE (ON ITS SECOND FLIGHT). THE LENGTH OF THE MISSION WILL BE 4 DAYS. THE EXPERIMENTS SELECTED FOR THE OSTA-1 PAYLOAD CONCERN REMOTE SENSING OF LAND RESOURCES, ENVIRONMENTAL QUALITY, OCEAN CONDITIONS, AND METEOROLOGICAL PHENOMENA. DURING ITS TIME IN ORBIT, THE SHUTTLE WILL ASSUME AN EARTH-VIEWING ORIENTATION, THUS ACCOMMODATING THE EXPERIMENTS OF THE OSTA-1 PAYLOAD. IN THIS ATTITUDE, CALLED Z-AXIS LOCAL VERTICAL (ZLV), THE SHUTTLE'S PAYLOAD BAY FACES THE EARTH ON A LINE PERPENDICULAR TO THE EARTH'S SURFACE. THE OSTA-1 PAYLOAD CONSISTS OF (1) SHUTTLE IMAGING RADAR-A (SIR-A), (2) SHUTTLE MULTISPECTRAL INFRARED RADIOMETER (SMIRR), (3) FEATURE IDENTIFICATION AND LOCATION EXPERIMENT (FILE), (4) MEASUREMENT OF AIR POLLUTION FROM SATELLITES (MAPS), (5) OCEAN COLOR EXPERIMENT (OCE), (6) NIGHT/DAY OPTICAL SURVEY OF LIGHTNING (NOSL), AND (7) HEPLEX BIOENGINEERING TEST (HBT). THE INSTRUMENTS FOR THE FIRST FIVE EXPERIMENTS WILL BE LOCATED IN THE PAYLOAD BAY. A PALLET, SUPPLIED BY THE EUROPEAN SPACE AGENCY, WILL MAKE THE INTERFACE BETWEEN THE PAYLOAD BAY AND THESE FIVE EXPERIMENTS. THE NOSL AND HBT INSTRUMENTS WILL BE LOCATED IN THE CREW COMPARTMENT. SIR-A, SMIRR, AND FILE ARE ALL CONCERNED IN VARIOUS WAYS WITH REMOTE SENSING OF LAND RESOURCES. THROUGH FILE FOCUSES ON THE PROBLEM OF DATA MANAGEMENT. MAPS IS CONCERNED WITH REMOTE SENSING OF ENVIRONMENTAL QUALITY. AND OCE IS CONCERNED WITH REMOTE SENSING OF OCEAN CONDITIONS. NOSL WILL INVOLVE THE CREW IN TAKING THE FIRST MOTION PICTURES AND PHOTOCELL READINGS OF LIGHTNING AND THUNDERSTORMS AS SEEN FROM ORBIT. HBT IS A PRELIMINARY STEP LEADING TO A PLANT PHYSIOLOGY EXPERIMENT SCHEDULED FOR SPACELAB 1.

----- OSTA-1, BROWN-----

INVESTIGATION NAME- HEPLEX BIOENGINEERING TEST (HBT)

NSSDC ID- OSTA-1 -07 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - A.H. BROWN U OF PENNSYLVANIA

BRIEF DESCRIPTION

THE HEPLEX BIOENGINEERING TEST (HBT) IS A PRELIMINARY TEST THAT SUPPORTS AN EXPERIMENT CALLED HEPLEX (FOR HELIANTHUS ANNUUS FLIGHT EXPERIMENT), PART OF THE PLANNED SPACELAB 1 MISSION. THE HBT HARDWARE CONSISTS OF A CONTAINER OF PLANTED POTS WITH VARYING SOIL MOISTURE LEVELS. THE TECHNICAL OBJECTIVE OF THE HEPLEX BIOENGINEERING TEST IS TO DETERMINE THE RELATIONSHIP BETWEEN INITIAL SOIL MOISTURE CONTENT AND FINAL PLANT HEIGHT AFTER GROWTH IN A MICROGRAVITY ENVIRONMENT. THE RESULTS WILL HELP DETERMINE THE OPTIMAL SOIL MOISTURE CONDITIONS FOR THE SPACELAB EXPERIMENT.

----- OSTA-1, ELACHI-----

INVESTIGATION NAME- SHUTTLE IMAGING RADAR-A (SIR-A)

NSSDC ID- OSTA-1 -01 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - C. ELACHI NASA-JPL
OI - W.E. BROWN NASA-JPL
OI - L.F. BELLWIG U OF KANSAS
OI - A.W. ENGLAND NASA JSC
OI - M. GUY CNES
OI - M. MACDONALD U OF ARKANSAS
OI - R.S. SAUNDERS NASA-JPL
OI - G. SCHABER US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF SHUTTLE IMAGING RADAR-A IS TO OBTAIN MAPLIKE IMAGES OF THE EARTH'S SURFACE TO EVALUATE THEIR UTILITY FOR GEOLOGIC EXPLORATION. THE SHUTTLE IMAGING RADAR-A (SIR-A) EXPERIMENT USES A SIDELOOKING, SYNTHETIC APERTURE RADAR WITH A VIEWING ANGLE OF 47 DEG TO CREATE TWO-DIMENSIONAL IMAGES OF THE EARTH'S SURFACE. THE IMAGING RADAR IS INDEPENDENT OF SUNLIGHT AND ABLE TO PENETRATE CLOUD COVER. A RADAR IMAGE 50 KM WIDE AND A TOTAL OF 200,000 KM LONG WILL BE PRODUCED. THE TOTAL COVERAGE WILL BE 10 MILLION SQUARE KILOMETERS, OR ABOUT THE AREA OF THE UNITED STATES. A RESOLUTION OF 40 M BOTH ACROSS AND ALONG THE TRACK OF THE BEAM CAN BE ATTAINED BY THIS SYSTEM. THE OPERATIONS WILL BE CONTROLLED BY STORED COMMANDS BUT CAN BE OVERRIDDEN BY REAL-TIME COMMANDS FROM THE GROUND OR THE CREW. THE RADAR IMAGES GATHERED BY SIR-A WILL BE COMPARED WITH OTHER DATA, PARTICULARLY LANDSAT IMAGES, TO DEVELOP GEOLOGIC INFORMATION FOR LOCATING HYDROCARBONS AND MINERAL DEPOSITS. RADAR IMAGERY RECORDS DIFFERENCES IN SURFACE ROUGHNESS AND TERRAIN ATTITUDE AND THUS CAN BE USED TO DELINEATE SUCH GEOLOGICAL FEATURES AS FAULTS, ANTICLINES, FOLDS AND DOMES, DRAINAGE PATTERNS, AND STRATIFICATION. LANDSAT MULTISPECTRAL IMAGERY CAN PROVIDE THE SUPPLEMENTARY INFORMATION NECESSARY TO IDENTIFY ROCK TYPES AND TYPES OF VEGETATION.

----- OSTA-1, GEOTZ-----

INVESTIGATION NAME- SHUTTLE MULTISPECTRAL INFRARED
RADIOMETER (SMIRR)

NSSDC ID- OSTA-1 -02 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - A.H. GEOTZ NASA-JPL
OI - L.C. ROMAN US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PURPOSE OF THE SHUTTLE MULTISPECTRAL INFRARED RADIOMETER EXPERIMENT IS TO DETERMINE THE SPECTRAL BANDS TO BE INCLUDED IN A FUTURE HIGH-RESOLUTION IMAGING SYSTEM FOR MAPPING ROCKS ASSOCIATED WITH MINERAL DEPOSITS FROM SPACE. THE SMIRR SYSTEM CONSISTS OF A TELESCOPE, A FILTER WHEEL, TWO DETECTORS, TWO FILM CAMERAS, AND SUPPORTING ELECTRONICS. THE TELESCOPE IS A MODIFIED VERSION OF THE MARINER TELESCOPE THAT GATHERED IMAGES OF VENUS AND MERCURY IN 1973. SINCE SMIRR IS NOT AN IMAGING DEVICE, PHOTOGRAPHS ARE NECESSARY TO LOCATE THE 100-M DIAMETER RADIOMETER BEARING WITHIN THE CAMERA'S GROUND VIEW (20 BY 25 KM). ONE CAMERA WILL TAKE BLACK AND WHITE PICTURES; THE OTHER, COLOR. THE FILTER WHEEL ALLOWS 10 FILTERS TO SAMPLE THE FOLLOWING SPECTRAL BANDS: FILTER 1 AND 2 -- 0.5 AND 0.6 MICROMETER FOR CORRELATION WITH LANDSAT; FILTERS 3 AND 4 -- 1.05 AND 1.2 MICROMETERS FOR FIELD MEASUREMENTS; FILTER 5 -- 1.6-MICROMETERS LANDSAT B BAND; FILTER 6 -- 2.1-MICROMETERS NO HYDROXYL ABSORPTION BAND; FILTERS 7, 8 AND 9 -- 2.17, 2.20, AND 2.22-MICROMETERS HYDROXYL 10H ABSORPTION BANDS; AND FILTER 10 -- 2.35-MICROMETERS CARBONATE ABSORPTION BAND. THE SHUTTLE MULTISPECTRAL INFRARED RADIOMETER WILL COLLECT DATA DURING DAYTIME PASSES OVER LAND MASSES. CLOUD COVERAGE SHOULD BE LESS THAN 30 PERCENT. A DATA-TAKING CYCLE CAN LAST FROM 2 TO 20 MINUTES, WITH A TOTAL OF 6 HOURS ALLOWED. THE OPERATIONS WILL BE CONTROLLED BY STORED COMMANDS OR BY REAL-TIME COMMANDS FROM THE CREW OR THE GROUND.

----- OSTA-1, KIM-----

INVESTIGATION NAME- OCEAN COLOR (OCE)

NSSDC ID- OSTA-1 -05 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
OCEANOGRAPHY

PERSONNEL
PI - W.H. KIM NASA-GSFC
OI - L.H. BLAINE NASA-GSFC
OI - R.D. FRASER NASA-GSFC
OI - H.E. HUANG NASA-GFC
OI - H. VAN DER PIEPER DFVLR

BRIEF DESCRIPTION

THE OCEAN COLOR EXPERIMENT (OCE) WILL SCAN WATER-UPWELLING ZONES SEEKING AREAS WHERE A HIGH CONCENTRATION OF CHLOROPHYLL-BEARING ALGAE SHIFTS THE PURE BLUE OF OCEAN WATER TO GREENISH. USING THIS INFORMATION TO MAP THE DISTRIBUTION OF ALGAE CAN HELP LOCATE FISH SCHOOLS OR ECOLOGICAL UPSETS CAUSED BY POLLUTANTS. THE OCE INSTRUMENT IS A MODIFIED VERSION OF THE U-2-BORNE OCEAN COLOR SCANNER. IT CONSISTS OF TWO MAIN MODULES - THE SCANNER AND THE ELECTRONICS. THE SCANNER IS MOUNTED ON THE EXPERIMENT PALLET SHELF, AND THE ELECTRONICS ARE COUPLED TO A COLD PLATE ON THE PALLET DECK. THE ROTATING MIRROR ON THE OCE INSTRUMENT SCANS PLUS OR MINUS 45 DEG FROM NADIR ACROSS THE DIRECTION OF FLIGHT WITH A GROUND RESOLUTION OF 3 KM. THE SCANNER WILL OPERATE IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNELS 1 AND 2 - 406 AND 510 NM (BLUE LIGHT); CHANNELS 3 TO 5 - 553, 585, AND 621 NM (GREEN LIGHT); CHANNELS 6 AND 7 - 655 AND 685 NM (RED LIGHT); AND CHANNEL 8 - 787 NM (NEAR-INFRARED). THE OCE WILL TAKE DATA DURING SUNLIT PASSES OVER TWO MAIN TEST AREAS - THE FRICTION AREA BETWEEN THE CANARY ISLAND CURRENT AND EQUATORIAL COUNTERCURRENT AND THE

UPWELLING AREA OFF THE COAST OF PERU. THE EXPERIMENT WILL ALSO TAKE DATA ALONG THE EASTERN COAST OF THE UNITED STATES - OFF CAPE COD AND GEORGIA. THE PAYLOAD RECORDER HAS THE CAPABILITY TO RECORD DATA FOR 25 2- TO 13- MIN OCEAN FLOWERS. CONSIDERABLE EXPERIMENTAL EFFORT WILL BE SPENT ELIMINATING THE EFFECTS OF SURFACE REFLECTIONS AND ATMOSPHERIC SCATTERINGS THAT OBSCURE THE INFORMATION SOUGHT.

----- OSTA-1, REICHEL, JR.-----

INVESTIGATION NAME- MEASUREMENT OF AIR POLLUTION FROM SATELLITES

NSSDC ID- OSTA-1 -04

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M.G. REICHEL, JR.
OI - M.L. CHAMBERLAIN
OI - W.D. HESKETH
OI - C.D. LUDWIG
OI - R.E. NEWELL
OI - L.R. PETERS
OI - W. SEILER
OI - J.W. SWINNERTON
OI - M.A. WALLIO

NASA-LARC
GEORGIA INST OF TECH
NASA-LARC
PHOTON RESEARCH INC
NASA INST OF TECH
U OF KENTUCKY
MPI-CHEMISTRY
US NAVAL RESEARCH LAB
NASA-LARC

BRIEF DESCRIPTION

THE MEASUREMENT OF AIR POLLUTION FROM SATELLITES (MAPS) EXPERIMENT WILL MEASURE THE DISTRIBUTION OF CARBON MONOXIDE IN THE TROPOSPHERE (UP TO 16 KM ABOVE THE EARTH'S SURFACE). THE PERFORMANCE OF THE MAPS INSTRUMENT UNDER VARIOUS TEMPERATURES AND OTHER ORBITAL CONDITIONS WILL INDICATE THE EFFICACY OF USING ORBITING SPACECRAFT TO MEASURE ENVIRONMENTAL QUALITY. THE MAPS EQUIPMENT CONSISTS OF AN ELECTRO-OPTICAL HEAD, AN ELECTRONICS MODULE, A DIGITAL TAPE RECORDER, AND AN AERIAL CAMERA. THE EQUIPMENT IS COUPLED TO A COLD PLATE AND MOUNTED ON THE EXPERIMENT PALLET SHELF. THE MAPS INSTRUMENT WILL MEASURE THE AMOUNT OF CO CONCENTRATION AT LOW LATITUDE, AN ALTITUDE OF 7-8 KM, AND AN ALTITUDE OF 10-12 KM. THE GROUND RESOLUTION IS 21 KM. THE AERIAL CAMERA MOUNTED ALONGSIDE THE MAPS ELECTRO-OPTICAL HEAD WILL PROVIDE INFORMATION ON CLOUD COVER AND THE TERRAIN OVER WHICH THE DATA ARE GATHERED. AFTER THE INSTRUMENT'S 30-MIN WARMUP, DATA-TAKING WILL CONTINUE THROUGHOUT THE EARTH-OBSERVING PERIOD WITH BALANCE AND GAIN CHECK RECURRING AT 12-HOUR INTERVALS.

----- OSTA-1, SCHAPPELL-----

INVESTIGATION NAME- FEATURE IDENTIFICATION AND LOCATION (FILE)

NSSDC ID- OSTA-1 -03

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - R.T. SCHAPPELL
OI - W.E. SILVERTSON
OI - J.C. TIEZ
OI - R.G. WILSON

MARTIN-MARIETTA AEROSP
NASA-LARC
MARTIN-MARIETTA AEROSP
NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THE FEATURE IDENTIFICATION AND LOCATION EXPERIMENT (FILE) IS TO DEVELOP THE MEANS TO DISTINGUISH AT THE GATHERING STAGE DATA REPRESENTING WATER, VEGETATION, BARE GROUND, AND SNOW OR CLOUDS. THE LONG-TERM GOAL, EXTENDING OVER SEVERAL SHUTTLE FLIGHTS, IS TO DEVELOP LANDMARK TRACKING TECHNOLOGY THAT WILL MEET THE NEEDS OF FUTURE EARTH RESOURCES AND GLOBAL MONITORING MISSIONS. THE FILE SYSTEM CONSISTS OF A SUNRISE SENSOR, TWO TELEVISION CAMERAS, A DECISIONMAKING ELECTRONICS UNIT, A BUFFER MEMORY, A TAPE RECORDER, AND A 70-MM CAMERA. THIS EQUIPMENT IS MOUNTED ON THE EXPERIMENT PALLET SHELF. THE SUNRISE SENSOR WILL ACTIVATE THE EXPERIMENT WHEN THE SUN IS 60 DEG FROM THE SPACE SHUTTLE'S ZENITH. THE TWO TV CAMERAS ARE EQUIPPED WITH OPTICAL FILTERS FOR VISUAL RED AND NEAR INFRARED, RESPECTIVELY. THE FILE INSTRUMENT WILL MEASURE THE SPECTRAL REFLECTANCE OF SCENES AT RED AND NEAR-INFRARED WAVELENGTHS AND DETERMINE THE RATIO OF THESE MEASUREMENTS. THE RATIO OF TARGET REFLECTANCE AT 0.65 MICRON (VISUAL RED) TO THAT AT 0.85 MICRON (NEAR INFRARED) IS CHARACTERISTIC FOR EACH OF THE CATEGORIES BEING STUDIED AND IS RELATIVELY INSENSITIVE TO VIEWING ANGLE, SUN ANGLE, AND ATMOSPHERIC EFFECTS. IT WILL CATEGORIZE SCENES AS VEGETATION, BARE GROUND, WATER, OR SNOW AND CLOUDS. AND IT WILL SUPPRESS FURTHER DATA ACQUISITION IN A CERTAIN CATEGORY AFTER IT HAS ACQUIRED A GIVEN NUMBER OF SCENES. UNDER CONTROL OF THE SUNRISE SENSOR, FILE WILL OPERATE DURING THE SUNLIT INTERVALS OF THE EARTH-OBSERVING PERIOD. THEN IT WILL BE TURNED OFF BY A COMMAND FROM THE CREW OR THE GROUND. THE EXPERIMENT WILL BE AUTONOMOUS WHILE IT IS IN OPERATION.

----- OSTA-1, VONNEGUT-----

INVESTIGATION NAME- NIGHT/DAY OPTICAL SURVEY OF LIGHTNING

NSSDC ID- OSTA-1 -06

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J. VONNEGUT
OI - R. BROOK
OI - O.H. VAUGHAN, JR.

STATE U OF NEW YORK
NM INST OF MINE & TECH
NASA-MSC

BRIEF DESCRIPTION

THE OBJECTIVE OF THE NIGHT/DAY OPTICAL SURVEY OF LIGHTNING IS TO OBTAIN MOTION PICTURE FILMS AND CORRELATED PHOTOCELL SENSOR SIGNALS OF LIGHTNING STORMS. THE NOSE EQUIPMENT CONSISTS OF THE CAMERA, THE ATTACHED PHOTOCELL SENSOR, AND THE CONNECTED TAPE RECORDER. DURING LAUNCH, BOOST, AND REENTRY, THIS EQUIPMENT WILL BE SECURED IN STORAGE LOCKERS IN THE CREW COMPARTMENT. IN ORBIT, THE EQUIPMENT WILL BE RETRIEVED AND ASSEMBLED FOR USE IN THE CREW CABIN. THE MOTION PICTURE CAMERA IS A 16-MM DATA ACQUISITION CAMERA, A MODEL WHICH HAS BEEN FLIGHT TESTED ON APOLLO AND SKYLAB MISSIONS. THE CREW WILL USE A MOTION PICTURE CAMERA TO FILM THE LIGHTNING FLASHES AND TAKE PHOTOCELL READINGS OF NIGHTTIME THUNDERSTORMS. DURING THE DAY, LIGHTNING DISCHARGES WILL BE DELINEATED BY A PHOTO-OPTICAL SYSTEM. THE MOTION PICTURE CAMERA WILL BE USED DURING THE DAY AS WELL TO FILM THE CLOUD STRUCTURE AND THE CONVECTIVE CIRCULATION IN THE STORM. THESE TECHNIQUES MAY BE ADAPTABLE TO IDENTIFYING SEVERE WEATHER SITUATIONS FROM METEOROLOGICAL SATELLITES.

***** SAN MARCO-D/L*****

SPACECRAFT COMMON NAME- SAN MARCO-D/L
ALTERNATE NAMES-

NSSDC ID- SM-DL

LAUNCH DATE- 03/08/82 WEIGHT- 200. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
ITALY CRA
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100. MIN
PERIAPSIS- 290. KM ALT

INCLINATION- 3. DEG
APOAPSIS- 1010. KM ALT

PERSONNEL

MG - M.B. WEINRED
SC - E.R. SCHMERLING
PM - R.S. TATUM
PS - M.W. SPENCER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE RESEARCH SATELLITES SAN MARCO -D/L AND -D/H IS TO EXPLORE THE RELATIONSHIP BETWEEN SOLAR ACTIVITY AND METEOROLOGICAL PHENOMENA, WITH EMPHASIS ON LOWER ATMOSPHERIC WINDS AND THERMOSPHERE-IONOSPHERE PHENOMENA FROM LOW (SAN MARCO -D/L) AND MULTISTATIONARY (SAN MARCO -D/H) ORBITS. TWO SCOUT LAUNCH VEHICLES INJECT BOTH SPACECRAFT INTO MUTUALLY PREDETERMINED ORBITS. BOTH SPACECRAFT HAVE PLANNED MISSION LIFETIMES OF 1.5 YR. THE SCIENCE INVESTIGATIONS IN SM-DL WILL MAKE USE OF THE FOLLOWING FIVE FLIGHT SENSORS: A DRAG BALANCE FOR DETERMINING NEUTRAL DENSITY, A WIND AND TEMPERATURE SPECTROMETER, AN ION VELOCITY INSTRUMENT, AN AIRGLOW SOLAR SPECTROMETER, AND AN ELECTRIC FIELD METER. THE SM-DL SATELLITE IS A 96.5-CM-DIAMETER SPHERE WITH FOUR 48-CM CANTED MONOPOLE TELEMETRY ANTENNAS AND THREE ORTHOGONAL PAIRS OF ELECTRIC FIELD PROBE SENSORS (ONE PAIR ORIENTED ALONG THE SPACECRAFT SPIN AXIS). AN INTERNAL STRUCTURAL CYLINDER (26-CM DIAM) EXTENDS SLIGHTLY THROUGH THE SPHERE AND IS COINCIDENT WITH THE SATELLITE SPIN AXIS. THE POWER SUPPLY CONSISTS OF A SOLAR-CELL ARRAY SPLIT INTO TWO SECTIONS, TWO RECHARGEABLE NICKEL-CADMIUM BATTERIES, AND ASSOCIATED CIRCUITRY. THE SATELLITE ATTITUDE DATA ARE PROVIDED BY A TRIAXIAL MAGNETOMETER, A HORIZON SENSOR, AND A DIGITAL SUN SENSOR. A MAGNETIC TORQUING SYSTEM IS USED TO CONTROL SPIN RATE AND SPACECRAFT ATTITUDE. A TAPE RECORDER RECORDS THE PCM TELEMETRY AT 6000 OPS FOR A MAXIMUM PERIOD OF 50 MIN. THE TRANSMISSION TO THE GROUND IS EITHER IN REAL TIME AT 6000 OPS OR ON RECORDER PLAYBACK AT 72 KDS.

----- SAN MARCO-D/L, BROGLIO-----

INVESTIGATION NAME- DRAG BALANCE AND AIR DENSITY

NSSDC ID- SM-DL -01

INVESTIGATIVE PROGRAM
CODE ST/CO-UP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - L. BROGLIO NATL RES COUNCIL ITALY

BRIEF DESCRIPTION
THE DRAG BALANCE INSTRUMENT, WHICH IS AN INTEGRAL PART OF THE SATELLITE, CONSISTS OF AN INNER MASS, AN ELASTIC ELEMENT, AND AN OUTER SHELL. THE DRAG BALANCE IS THE CONNECTING ELASTIC ELEMENT BETWEEN THE OUTER LIGHT SHELL AND THE INNER HEAVY BODY. THE CENTER OF THE BALANCE IS LOCATED AT THE SATELLITE GEOMETRIC CENTER, OR THAT POINT WHICH IS THE GEOMETRIC CENTER BOTH OF THE INNER BODY AND THE SHELL. THIS INSTRUMENT MEASURES THE RELATIVE TRANSLATIONS BETWEEN THE SHELL AND THE INNER BODY BOTH IN VALUE AND DIRECTION, RESOLVING ANY RELATIVE TRANSLATION ALONG THREE MUTUALLY ORTHOGONAL AXES. THESE THREE AXES ARE FIXED TO THE BODY, ONE OF THEM BEING COINCIDENT WITH THE POLAR SYMMETRY AXIS OF THE SATELLITE, BEING FIXED TO THE SATELLITE, THE AXIS ROTATES WITH IT IN THE FREE-PRECESSION MOTION AROUND THE CENTER OF GRAVITY. THE BALANCE IS DESIGNED IN SUCH A WAY THAT THE MAXIMUM TRANSLATION BETWEEN THE SHELL AND THE BODY IS GENERALLY OF THE ORDER OF 0.01 MM. IN MOST CASES THE DRAG FORCE AT THE ORBIT APOGEE IS NEGLIGIBLE. AS A CONSEQUENCE, THE APOGEE DATA ARE USED TO GET AN IN-FLIGHT CALIBRATION OF THE BALANCE. THUS, THE TRANSLATION OF THE ELASTIC SYSTEM IS CHANGED INTO VOLTAGES THAT ARE AMPLIFIED AND DEMODULATED TO OBTAIN DC SIGNALS.

----- SAN MARCO-D/L, HANSON-----

INVESTIGATION NAME- ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER) IVI

NSSDC ID- SM-DL -03 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL
PI - W.B. HANSON U OF TEXAS, DALLAS

BRIEF DESCRIPTION
THIS EXPERIMENT IS A PLANAR RETARDING POTENTIAL ANALYZER, DESIGNED TO OBTAIN MEASUREMENTS OF RELATIVE THERMAL-ION VELOCITY, PLASMA DENSITY, AND ION TEMPERATURE. THE ION ANGLE OF ARRIVAL CAN BE DETERMINED BY USE IN THE INSTRUMENT DESIGN OF A SQUARE APERTURE COLLIMATOR AND A SPLIT COLLECTOR. TOGETHER WITH KNOWLEDGE OF SPACECRAFT MOTION, THIS ALLOWS COMPUTATION OF THE THREE-DIMENSIONAL THERMAL-ION MOTION ALONG THE ORBITAL PATH. PLASMA DENSITY AND TEMPERATURE ARE CALCULATED BY INTERPRETATION OF THE VOLTAGE-AMPERAGE PROFILE PRODUCED BY THE INSTRUMENT FOR A GIVEN IMPRESSED VOLTAGE PATTERN ON THE GRIDDED COLLECTOR. ION VELOCITY MEASUREMENT IS PLANNED ONCE EACH SPACECRAFT SPIN PERIOD (10 S).

----- SAN MARCO-D/L, MAYNARD-----

INVESTIGATION NAME- 3-AXIS ELECTRIC FIELD INSTRUMENT (EFI)

NSSDC ID- SM-DL -05 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL
PI - W.C. MAYNARD NASA-GSFC
OI - J.P. HEPPNER NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO OBSERVE THE THREE COMPONENTS OF AMBIENT ELECTRIC FIELD OVER THE SATELLITE TRAJECTORY. THREE PAIRS, A PAIR FOR EACH COMPONENT, OF CYLINDRICAL PROBES ARE USED. A BODY IN A PLASMA ESTABLISHES A POTENTIAL RELATIVE TO THE PLASMA THAT MAINTAINS A CURRENT BALANCE. IF NO CURRENT IS DRAWN FROM THE BODY, ITS POTENTIAL DEPENDS ON THE POTENTIAL DIFFERENCES WITHIN THE PLASMA. FOR EACH COMPONENT, THE FLOATING POTENTIAL (OF EACH OF THE TWO SYMMETRICALLY PLACED PROBES WITH RESPECT TO THE SPACECRAFT) IS MEASURED. FROM THESE OBSERVATIONS, THE ELECTRIC FIELD CAN BE CALCULATED FOR KNOWN CONDITIONS OF SATELLITE MOTION, PROBE GEOMETRY, AND MAGNETIC FIELD. TWO PAIRS OF PROBES EXTEND FROM THE SATELLITE EQUATOR, AND ONE PAIR IS ORIENTED ALONG THE SPIN AXIS.

----- SAN MARCO-D/L, SCHMIDTKE-----

INVESTIGATION NAME- AIRGLOW-SOLAR SPECTROMETER

NSSDC ID- SM-DL -02 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
AERONOMY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - G. SCHMIDTKE INST FUR PHYS WELTRAUM
OI - F. FISCHER INST FUR PHYS WELTRAUM
OI - W. KNOTHE INST FUR PHYS WELTRAUM
OI - W. MASCHER INST FUR PHYS WELTRAUM
OI - C. HUNTER INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION
THE SENSOR MEASURES THE EQUATORIAL DAY AND NIGHT AIRGLOW, THE SOLAR RADIATION REFLECTED FROM THE SURFACE AND CLOUDS, AND THE RADIATION OF INTERPLANETARY AND INTERGALACTIC ORIGIN REACHING THE SATELLITE IN THE SPECTRAL RANGE FROM 700 TO 20 NM WITH A SPECTRAL RESOLUTION OF 0.7 TO 4 NM. FOUR SPECTROMETERS, 4 GRATINGS, AND 17 MULTIPLIERS ARE USED. A TOROIDAL CONCAVE GRATING, OF RADIUS EQUAL TO 115.5 MM, WITH HOLOGRAPHICALLY FORMED CURVED LINES, HAS BEEN CHOSEN TO ACHIEVE WAVELENGTH SCANNING. THE SCANNING WILL BE PERFORMED BY STEPWISE ROTATION OF THE GRATING WITHIN PLUS OR MINUS 3 DEG. ONE STEP AT EACH REVOLUTION OF THE SATELLITE. EXIT SLITS ARE POSITIONED AT OPTIMUM DISTANCES NEAR THE REGULAR CIRCLE. THE EXIT SLITS ARE FOLLOWED BY MULTIPLIERS. A FILTER WHEEL PROVIDES THREE FILTERS FOR EACH MULTIPLIER WORKING ABOVE 130 NM.

----- SAN MARCO-D/L, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE SPECTROMETER (WATS)

NSSDC ID- SM-DL -04 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - W.W. SPENCER NASA-GSFC
OI - G.R. CARIGNAN U OF MICHIGAN

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE IN SITU NEUTRAL WINDS, NEUTRAL PARTICLE TEMPERATURES, AND THE CONCENTRATION OF SELECTED GASES. THREE COMPONENTS OF THE WINDS--ONE NORMAL TO THE SATELLITE DIRECTION--ARE MEASURED. TWO SCANNING BAFFLES ARE USED, ONE MOVING VERTICALLY IN FRONT OF THE SENSOR, SUCH AS THAT USED ON SATELLITE ATMOSPHERE EXPLORER-C (AE-C) NEUTRAL ATMOSPHERE TEMPERATURE EXPERIMENT (NATE), AND ONE MOVING HORIZONTALLY NEARLY IDENTICAL IN CONCEPT TO THE VERTICALLY SCANNING BAFFLE AND INCORPORATED ON THE NATE FOR AE-D AND -E. THE MAGNITUDES OF THE HORIZONTAL AND VERTICAL COMPONENTS OF THE WIND NORMAL TO THE SPACECRAFT VELOCITY VECTOR ARE COMPUTED FROM MEASUREMENTS OF THE ANGULAR RELATIONSHIP BETWEEN THE NEUTRAL PARTICLE STREAM AND THE SENSOR. THE COMPONENT OF THE TOTAL STREAM VELOCITY IN THE SATELLITE DIRECTION IS MEASURED DIRECTLY BY THE RETARDING POTENTIAL QUADRUPOLE (RPO) THROUGH DETERMINATION OF THE REQUIRED RETARDING POTENTIAL. FROM THESE QUANTITATIVE MEASUREMENTS, THE WIND VECTOR IS COMPUTED. THE TEMPERATURE TECHNIQUE USED ON THE AE NATE PROVIDES THE BASIS FOR THE TEMPERATURE MEASUREMENTS FOR THIS MISSION. IT SHOULD BE EMPHASIZED THAT THE WIND AND TEMPERATURE MEASUREMENTS CAN BE PERFORMED IN THE SAME OPERATING MODE. FOR COMPOSITION MEASUREMENTS, THE RPO MASS SPECTROMETER IS USED IN A SEPARATE OPERATING MODE DESIGNED FOR THIS PURPOSE.

***** SAN MARCO-D/M*****

SPACECRAFT COMMON NAME- SAN MARCO-D/M
ALTERNATE NAMES-

NSSDC ID- SM-DM

LAUNCH DATE- 07/00/83 WEIGHT- 65. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
ITALY CBA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 480. MIN
PERIAPSIS- 420. KM ALT INCLINATION- 2.9 DEG
APOAPSIS- 27400. KM ALT

PERSONNEL
MG - W.B. WEINBERG NASA HEADQUARTERS
SC - E.R. SCHERLING NASA HEADQUARTERS
PM - R.S. TATUM NASA-GSFC
PS - W.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THE PRIMARY PURPOSE OF THE RESEARCH SATELLITES SAN MARCO -D/L AND -D/M IS TO EXPLORE THE RELATIONSHIP BETWEEN SOLAR ACTIVITY AND METEOROLOGICAL PHENOMENA, WITH EMPHASIS ON LOWER ATMOSPHERIC WINDS AND THERMOSPHERE-IONOSPHERE PHENOMENA FROM LOW (SAN MARCO-D/L) AND MULTISTATIONARY (SAN MARCO-D/M) ORBITS. TWO SCOUT LAUNCH VEHICLES INJECT BOTH SPACECRAFT INTO MUTUALLY PREDETERMINED ORBITS. BOTH SPACECRAFT HAVE PLANNED MISSION LIFETIMES OF 1.5 YEARS. SAN MARCO-D/M IS BUILT AROUND A SINGLE EXPERIMENT. THE PURPOSE OF THIS SPACECRAFT IS TO MONITOR CLOUD COVER AND OZONE CONTENT, WITH ONE-THIRD THE PERIOD OF AN EARTH-SYNCHRONOUS OR STATIONARY SATELLITE. OBSERVATIONS MAY BE

REPEATED THREE TIMES PER DAY. THE GENERAL APPEARANCE OF SM-0/M IS THAT OF TWO CYLINDERS WITH A COMMON AXIS, ONE WITH A DIAMETER OF 70 CM AND HEIGHT OF 40 CM, WITH THE SECOND CYLINDER EXTENDING FROM THE END OF THE FIRST FOR AN ADDITIONAL 42 CM AND WITH A DIAMETER OF ABOUT 32 CM. THE SURFACE OF THE LARGER CYLINDER IS COVERED WITH 1296 SOLAR CELLS THAT FEED 2 RECHARGEABLE BATTERY PACKS. THE SPACECRAFT IS SPIN STABILIZED ALONG THE AXIS OF ITS CYLINDRICAL STRUCTURE, AND SCANNING OPERATION FOR THE INSTRUMENT IS DEPENDENT UPON THE SATELLITE SPIN.

----- SAN MARCO-0/M, BROGLIO-----

INVESTIGATION NAME- IN RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT

NSDDC ID- SM-0M -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - L. BROGLIO

NATL RES COUNC I/ALY

BRIEF DESCRIPTION

THIS RADIOMETER EXPERIMENT IS DESIGNED TO MONITOR CLOUD COVER AND OZONE CONTENT FROM A NEAR-EQUATORIAL ORBIT. A HIGH-RESOLUTION (25-KM INSTANTANEOUS FIELD OF VIEW, IFOV) AND LOW-RESOLUTION (200-KM IFOV) MODE ARE BOTH AVAILABLE. EITHER MODE IS OPERATED THROUGH A COMMON TELESCOPE, FILTER WHEEL, AND SCAN-MIRROR SYSTEM. THERE ARE THREE HG, CD, TE (MERCURY, CADMIUM, TELLURIUM) DETECTORS. THE HIGH-RESOLUTION (HR) MODE OBSERVES IN A 10.5-12.5 MICROMETER BAND. THE LOW-RESOLUTION (LR) MULTISPECTRAL MODE OPERATES IN THE SAME BAND (CHANNEL 3) PLUS SIX OTHER BANDS BETWEEN 8.85 AND 15.01 MICROMETERS. BANDWIDTH FOR EACH OF THESE SIX BANDS IS LESS THAN .35 MICROMETERS, AND THE LOWER EDGES OF THE BANDWIDTHS ARE AT 8.85, 9.59 (OZONE), 13.81, 14.14 (CO2), 14.89 (CO2) AND 14.98 (CO2) MICROMETERS. IN THE LR MODE, TWO CHANNELS ARE SELECTED FOR SIMULTANEOUS OBSERVING. SCANNING IS ACCOMPLISHED BY SPACECRAFT SPIN PLUS MIRROR STEPPING ONCE EACH REVOLUTION. ONE FRAME REQUIRES 6.5 (IMAGERY) TO 7.5 (SOUNDING) MIN AND CALIBRATION OCCURS ONCE EACH FRAME.

----- SIRIO-2-----

SPACECRAFT COMMON NAME- SIRIO-2
ALTERNATE NAMES- SIRIO-11

NSDDC ID- SIRIO-2

LAUNCH DATE- 02/20/82 WEIGHT- 420. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL
ITALY

ESA-ESTEC
CRA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN
PERIAPSIS- 32400. KM ALT

INCLINATION- 0. DEG
APOAPSIS- 35600. KM ALT

PERSONNEL

MG - P. BERLIN

ESA-TOLDOUSE

BRIEF DESCRIPTION

THE SIRIO-2 GEOSTATIONARY SPACECRAFT CARRIES TWO INDEPENDENT PAYLOADS: (1) AN S-BAND MULTICHANNEL TRANSDUCER FOR METEOROLOGICAL DATA DISSEMINATION ('MOD') IN AFRICA, AND (2) A LASER DETECTION/TIME-TAG/RETROREFLECTOR ASSEMBLY TO PERMIT ATOMIC CLOCK SYNCHRONIZATION OVER INTERCONTINENTAL DISTANCES (LASER SYNCHRONIZATION FROM STATIONARY ORBIT - 'LASSO'). THE CYLINDRICAL SHAPED SPACECRAFT MEASURES 144 CM IN DIAMETER AND 240 CM IN LENGTH INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS ARE EQUIPMENT PLATFORMS AND A CENTRAL THRUST CONE CARRYING CONVENTIONAL HOUSEKEEPING ELECTRONICS IN ADDITION TO PAYLOADS. ATTITUDE, ORBIT AND SPIN RATE CONTROL ARE PERFORMED USING A HYDRAZINE PROPULSION SYSTEM INCLUDING FOUR THRUSTERS. THE SPIN RATE WILL BE MAINTAINED AT 90 RPM THROUGHOUT THE TWO-YEAR NOMINAL LIFETIME. A MECHANICALLY DESPUN ANTENNA RELAYS S-BAND TELEMETRY (METEOROLOGICAL AND HOUSEKEEPING), WHILE A TRADITIONAL OMNIDIRECTIONAL TURNSTILE SYSTEM SUPPORTS VHF RANGING AND TELECOMMANDS, AS WELL AS HOUSEKEEPING TELEMETRY IN TRANSFER ORBIT AND AS BACKUP IN GEOSTATIONARY ORBIT.

----- SRE-----

SPACECRAFT COMMON NAME- SRE
ALTERNATE NAMES- SOLAR MESOSPHERE EXPL

NSDDC ID- SRE

LAUNCH DATE- 09/10/81 WEIGHT- 140. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-GS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN
PERIAPSIS- 300. KM ALT

INCLINATION- 97.6 DEG
APOAPSIS- 300. KM ALT

PERSONNEL

MG - R.D. WEINER
SC - S.G. TILFORD
PM - J.J. PAULSON
PS - C.A. BARTH

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
N OF COLORADO

BRIEF DESCRIPTION

THE SOLAR MESOSPHERE EXPLORER (SME) MISSION OBJECTIVE IS TO UNDERSTAND WHAT PHYSICAL PHENOMENA CAUSE CHANGES IN THE DENSITY AND DISTRIBUTION OF THE EARTH'S OZONE. SPECIFIC MISSION OBJECTIVES ARE (1) TO UNDERSTAND THE NATURE AND MAGNITUDE OF CHANGES IN MESOSPHERIC OZONE DENSITIES THAT ARE THE RESULT OF CHANGES IN THE SOLAR ULTRAVIOLET FLUX; (2) TO UNDERSTAND THE RELATIONSHIP BETWEEN SOLAR FLUX, OZONE, AND THE TEMPERATURE OF THE MESOSPHERE; (3) TO UNDERSTAND THE RELATIONSHIP BETWEEN MESOSPHERIC OZONE AND WATER VAPOR; (4) TO STUDY THE ATMOSPHERIC OZONE CHEMISTRY FOLLOWING SOLAR PROTON EVENTS; (5) TO UNDERSTAND THE STABILITY OF OZONE AGAINST CHANGES OF ANY KIND IN MESOSPHERIC CONDITIONS; AND (6) TO EXTEND ANY INCREASE IN UNDERSTANDING OF THE MESOSPHERE INTO THE STRATOSPHERE. THESE OBJECTIVES ARE ACCOMPLISHED BY MEASURING OZONE PARAMETERS AND THE PROCESSES IN THE MESOSPHERE AND UPPER STRATOSPHERE THAT DETERMINE THEIR VALUES. SIMULTANEOUS MEASUREMENTS ARE MADE OF OZONE, THE SOLAR ULTRAVIOLET RADIATION THAT PRODUCES AND DESTROYS IT, AND THE AMOUNT OF WATER VAPOR AND NITROGEN DIOXIDE WHOSE PHOTODISSOCIATION PRODUCTS CAUSE CATALYTIC DESTRUCTION OF OZONE. TEMPERATURE AND PRESSURE ARE ALSO MEASURED. THE SATELLITE EXPERIMENT COMPLEMENT CONSISTS OF A SOLAR ULTRAVIOLET SPECTROMETER, AN OZONE UV SPECTROMETER, AN INFRARED RADIOMETER, AN INFRARED SPECTROMETER, AND A NITROGEN DIOXIDE SPECTROMETER. IN ADDITION, A SOLAR PROTON ALARM MECHANISM IS CARRIED TO MEASURE THE INTEGRATED SOLAR FLUX IN THE RANGE 10-500 MEV. SPIN STABILIZED AT ABOUT 5 RPM, THE SATELLITE MOVES IN A 3 A.M. - 3 P.M. SUN-SYNCHRONOUS ORBIT. THE SPACECRAFT SHAPE IS THAT OF A RIGHT OCTAGONAL PRISM SLIGHTLY UNDER 1 M IN DIAMETER AND .75 M IN LENGTH. THE BASE MODULE HOUSES ALL SPACECRAFT SUBSYSTEMS EXCEPT THE SCIENTIFIC PAYLOAD AND DATA STORAGE. THE OBSERVATORY MODULE CONTAINING THE FIVE SCIENTIFIC INSTRUMENTS, ASSOCIATED ENGINEERING SENSORS, AND THE DATA STORAGE SYSTEM IS ATTACHED AS AN ASSEMBLY TO ONE OF THE OCTAGON FACES OF THE BASE MODULE. THE LAUNCH VEHICLE ADAPTOR IS MOUNTED TO THE OPPOSITE OCTAGONAL FACE. THE SPIN AXIS IS ORIENTED NORMAL TO THE ORBITAL PLANE IN THE DATA-TAKING MODE. A MAGNETIC CONTROL SYSTEM MAINTAINS THE ATTITUDE OF THE SPIN AXIS TO WITHIN PLUS OR MINUS 1 DEG PITCH AND PLUS OR MINUS 2 DEG YAW, AND IS NOT USED DURING DATA-TAKING PERIODS. THERE IS A SEPARATE SPIN RATE CONTROL. THE COMMAND SYSTEM IS CAPABLE OF EXECUTING EITHER DISCRETE OR MODAL COMMANDS IN REAL TIME OR FROM STORED PROGRAM CONTROL. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE TELEMETRY SYSTEM IS PCM AND CAN BE USED EITHER IN A REAL TIME OR IN A TAPE RECORDED MODE.

----- SRE, BARTH-----

INVESTIGATION NAME- UV OZONE

NSDDC ID- SRE -01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTHMAN
OI - B.J. THOMAS
OI - J.C. GILLE
OI - A.I. STEWART
OI - C.W. HORD
OI - P.J. CRUTZEN
OI - R.E. DICKINSON
OI - P.L. BAILEY
OI - J.F. HODON
OI - G.E. THOMAS
OI - J. LONDON

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NATL CTR FOR ATMOS RES
NOAA
U OF COLORADO
U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVE OF THE ULTRAVIOLET OZONE EXPERIMENT IS TO MEASURE OZONE ABSORPTION OF RAYLEIGH-SCATTERED SUNLIGHT IN THE MIDDLE ULTRAVIOLET REGION. A DUAL-CHANNEL, EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 2460-3100 A AND 2710-3350 A VIEWS NORMAL TO THE SPIN AXIS. THE FIRST ORDER DISPERSION IS 10 A/MM, AND AT HALF MAXIMUM THE FULL WIDTH OF THE SIGNAL IS 30 A. THERE ARE 64 GRATING STEPS PER SCAN SO THAT EACH 5-SEP CHANGES THE WAVELENGTH BY 10 A. THE FIELD OF VIEW SWEEPS THROUGH THE LIMS, SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 5.5 KM IN HEIGHT AT THE EARTH'S LIMS.

----- SME, BARTH-----

INVESTIGATION NAME- INFRARED RADIOMETER (4 CHANNELS)

NSSDC ID- SME -02

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
O1 - G.J. ROTTMAN	U OF COLORADO
O1 - R.J. THOMAS	U OF COLORADO
O1 - J.C. GILLE	NATL CTR FOR ATMOS RES
O1 - P.L. BAILEY	NATL CTR FOR ATMOS RES
O1 - J.F. NOKON	NOAA
O1 - A.I. STEWART	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - G.E. THOMAS	U OF COLORADO
O1 - J. LONDON	U OF COLORADO
O1 - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
O1 - R.E. DICKINSON	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THE INFRARED RADIOMETER EXPERIMENT IS TO DETERMINE THE ALTITUDE-MIXING RATIO PROFILES FOR WATER AND OZONE FROM THERMAL EMISSIONS. PRESSURE AND TEMPERATURE ARE ALSO DETERMINED. A DUAL-CHANNEL RADIOMETER/TELESCOPE HAS THE FOLLOWING SPECTRAL BANDS: 12.2-13.2 MICROMETERS (NOMINAL VALUE 15.5 MICROMETER), 15.7-16.7 (15.5); 18.6-20.6 (19.6); AND 7.2-8.1 MICROMETERS (6.5). THE FULL WIDTHS AT HALF MAXIMUM ARE 4.0, 1.0, 2.0, AND 1.1 MICROMETERS, RESPECTIVELY. ALL FOUR CHANNELS WILL UTILIZE HG, CD, AND TE DETECTORS. WAVELENGTH SEPARATION IS ACCOMPLISHED WITH MULTILAYER BANDPASS FILTERS. THE INSTRUMENT LINE OF SIGHT IS NORMAL TO THE SPIN AXIS, AND THE FIELD OF VIEW SWEEPS THROUGH THE LIMB, SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- 1.27 MICROMETER AIRGLOW

NSSDC ID- SME -03

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
O1 - G.J. ROTTMAN	U OF COLORADO
O1 - R.J. THOMAS	U OF COLORADO
O1 - J.C. GILLE	NATL CTR FOR ATMOS RES
O1 - P.L. BAILEY	NATL CTR FOR ATMOS RES
O1 - J.F. NOKON	NOAA
O1 - A.I. STEWART	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - G.E. THOMAS	U OF COLORADO
O1 - J. LONDON	U OF COLORADO
O1 - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
O1 - R.E. DICKINSON	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THE 1.27-MICROMETER AIRGLOW EXPERIMENT IS TO OBTAIN LIMB-SCANNING MEASUREMENTS OF THE 1.27-MICROMETER AIRGLOW IN THE 50- TO 80-KM ALTITUDE RANGE, AND OF THE HYDROXYL EMISSION BETWEEN 0.8 AND 2.4 MICROMETERS. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 0.7-1.4 AND 1.2-2.4 MICROMETERS VIEWS NORMAL TO THE SPIN AXIS. THE CHANNEL BANDWIDTHS ARE 0.7 AND 1.2 MICROMETERS, AND THE DISPERSION AT THE EXIT SLIT IS 100 A/MM. THE FULL WIDTH OF THE SIGNAL AT HALF MAXIMUM IS 70 A. THERE ARE 256 GRATING STEPS PER SCAN SO THAT EACH STEP CHANGES THE SIGNAL WAVELENGTH BY 27 A. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB, SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- VISIBLE NITROGEN DIOXIDE

NSSDC ID- SME -04

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
O1 - G.J. ROTTMAN	U OF COLORADO
O1 - R.J. THOMAS	U OF COLORADO
O1 - J.C. GILLE	NATL CTR FOR ATMOS RES
O1 - P.L. BAILEY	NATL CTR FOR ATMOS RES
O1 - J.F. NOKON	NOAA
O1 - A.I. STEWART	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - G.E. THOMAS	U OF COLORADO
O1 - J. LONDON	U OF COLORADO

O1 - P.J. CRUTZEN
O1 - R.E. DICKINSON

NATL CTR FOR ATMOS RES
NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THE VISIBLE NITROGEN DIOXIDE EXPERIMENT IS TO MEASURE THE DISTRIBUTION OF NITROGEN DIOXIDE IN THE 20- TO 40-KM ALTITUDE REGION. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATES IN THE FOLLOWING WAVELENGTH INTERVALS: 3250-4500 A (2ND ORDER) AND 5200-7700 A (1ST ORDER). THE DISPERSION AT THE EXIT SLIT IS 24 A/MM, AND THE SIGNAL AT HALF MAXIMUM HAS A FULL WIDTH OF 10.6 A. SINCE THERE ARE 256 GRATING STEPS PER SCAN, A STEP CHANGE CHANGES THE FIRST CHANNEL SIGNAL BY 4.9 A AND THE SECOND CHANNEL BY 9.8 A. THE INSTRUMENT LINE OF SIGHT IS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB, SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- SOLAR UV MONITOR

NSSDC ID- SME -05

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
O1 - G.J. ROTTMAN	U OF COLORADO
O1 - R.J. THOMAS	U OF COLORADO
O1 - J.C. GILLE	NATL CTR FOR ATMOS RES
O1 - P.L. BAILEY	NATL CTR FOR ATMOS RES
O1 - J.F. NOKON	NOAA
O1 - A.I. STEWART	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - G.E. THOMAS	U OF COLORADO
O1 - J. LONDON	U OF COLORADO
O1 - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
O1 - R.E. DICKINSON	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THE SOLAR ULTRAVIOLET MONITOR EXPERIMENT IS TO MONITOR THE INCOMING SOLAR RADIATION TO DETERMINE THE EFFECT ON THE OZONE CONCENTRATIONS. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 2200-3100 A AND 1600-2500 A HAS A LOOK DIRECTION 45 DEG TO THE SPACECRAFT AXIS OF ROTATION. THE DISPERSION AT THE EXIT SLIT IS 20 A/MM AND THE FULL WIDTH AT HALF MAXIMUM IS 14 A. SINCE THERE ARE 64 STEPS PER GRATING SCAN, EACH STEP CHANGES THE SIGNAL BY 14 A. IN A 3 A.M. - 3 P.M. ORBIT THE SOLAR MONITOR SCANS THROUGH THE SUN ONCE PER SPACECRAFT REVOLUTION. THE ACCEPTANCE ANGLE OF THE INSTRUMENT IS PLUS OR MINUS 10 DEG.

----- SME, BARTH-----

INVESTIGATION NAME- SOLAR PROTON ALARM

NSSDC ID- SME -06

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
O1 - G.J. ROTTMAN	U OF COLORADO
O1 - R.J. THOMAS	U OF COLORADO
O1 - J.C. GILLE	NATL CTR FOR ATMOS RES
O1 - P.L. BAILEY	NATL CTR FOR ATMOS RES
O1 - J.F. NOKON	NOAA
O1 - A.I. STEWART	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - G.E. THOMAS	U OF COLORADO
O1 - J. LONDON	U OF COLORADO
O1 - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
O1 - R.E. DICKINSON	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE SOLAR PROTON ALARM EXPERIMENT DETECTS PROTONS BETWEEN 30 AND 500 MEV. WHEN THE FLUX EXCEEDS A SELECTED VALUE THE INSTRUMENT SIGNALS AN OPPORTUNITY TO ALTER SCIENCE COMMANDS TO OBSERVE THE EFFECTS OF SOLAR PROTONS ON ATMOSPHERIC CONSTITUENTS.

***** SPACE SHUTTLE LDEF-A*****

SPACECRAFT COMMON NAME- SPACE SHUTTLE LDEF-A
ALTERNATE NAMES- LONG DURATION EXPOS.FAC., LDEF

NSSDC ID- SSLDEF

LAUNCH DATE- 10/02/84
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

WEIGHT- 9200. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OAST

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.3 MIN INCLINATION- 28.5 DEG
PERIAPSIS- 360. KM ALT APOAPSIS- 360. KM ALT

PERSONNEL
RG - M.C. HILL NASA HEADQUARTERS
PI - W.M. KINARD NASA-LARC

BRIEF DESCRIPTION
THE LDEF IS BEING DEVELOPED BY THE NASA OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY AND THE NASA/ANGLEY RESEARCH CENTER TO ACCOMMODATE, USING SHUTTLE, A CLASS OF TECHNOLOGY, SCIENCE, AND APPLICATIONS EXPERIMENTS WHICH REQUIRE A FREE-FLYING EXPOSURE IN SPACE AND WHICH BENEFIT FROM POST-FLIGHT LABORATORY INVESTIGATIONS WITH THE RETRIEVED EXPERIMENT HARDWARE. IT IS PLANNED TO REGULARLY LAUNCH AND RECOVER LDEF AT APPROXIMATELY YEARLY INTERVALS. THE APPROVED EXPERIMENTS ARE NOW BEING DEVELOPED.

----- SPACE SHUTTLE LDEF-A, AMLBORN-----

INVESTIGATION NAME- ORBITAL LUBRICATION EXPERIMENT

NSSDC ID- SSLDEF -25 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - G. AMLBORN BALL AEROSPACE SYS DIV
OI - V. FRIEDEL BALL AEROSPACE SYS DIV

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO EVALUATE THE CUMULATIVE EFFECTS OF SPACE ON LUBRICANT OILS. SMALL CHANGES CAUSED BY SPACE EXPOSURE ARE IMPORTANT TO SUCH PHYSICAL BEHAVIOR AS FRICTION AND SURFACE WETTING. RADIATION EFFECTS ARE VIRTUALLY UNKNOWN. LUBRICANTS CONSIDERED FOR TESTING INCLUDE SATURATED HYDROCARBONS, PI-ESTERS, SILICONES, PENETAERYTHRITOL ESTERS, AND PERFLUOROALKYLPOLYETHERS.

----- SPACE SHUTTLE LDEF-A, BANKS-----

INVESTIGATION NAME- ION BEAM TEXTURED AND COATED SURFACES

NSSDC ID- SSLDEF -01 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - B.A. BANKS NASA-LERC
OI - M.J. MIRICH NASA-LERC
OI - A.J. WEIGAND NASA-LERC

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES THE EFFECT OF THE SPACE SHUTTLE LAUNCH AND NEAR-EARTH SPACE ENVIRONMENT EXPOSURE ON THE OPTICAL PROPERTIES OF ION BEAM TEXTURED HIGH-ABSORBENCE SOLAR THERMAL CONTROL SURFACES. VERIFICATION OF THE DURABILITY OF THESE SURFACES IS CONDUCTIVE TO THE ACCEPTANCE OF THIS TECHNOLOGY ON FUTURE SPACE SYSTEMS.

----- SPACE SHUTTLE LDEF-A, BLUE-----

INVESTIGATION NAME- EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS

NSSDC ID- SSLDEF -26 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - M.D. BLUE GEORGIA INST OF TECH
OI - J.J. GALLAGHER GEORGIA INST OF TECH
OI - R.G. SHACKELFORD GEORGIA INST OF TECH

BRIEF DESCRIPTION
THE EFFECTS OF SPACE EXPOSURE ON THE PERFORMANCE OF LASERS, RADIATION DETECTORS, AND OTHER OPTICAL COMPONENTS ARE MEASURED. FROM THE RESULTS OBTAINED, GUIDES FOR COMPONENT SELECTION ARE ESTABLISHED.

----- SPACE SHUTTLE LDEF-A, BOURRIEU-----

INVESTIGATION NAME- OPTICAL FIBERS AND COMPONENTS

NSSDC ID- SSLDEF -43 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J. BOURRIEU CERN/CNRA

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO EXAMINE THE RADIATION EFFECTS ON FIBER OPTIC WAVEGUIDES WHICH ARE USED AS IMPORTANT COMPONENTS IN NEW COMMUNICATION SYSTEMS, OPTOELECTRONIC CIRCUITS AND DATA LINKS. COMPARISONS OF RADIATION-INDUCED DAMAGES IN FLIGHT AND DURING LABORATORY TESTS ARE TO DETERMINE THE VALIDITY OF IRRADIATION TESTS WITH RADIOACTIVE SOURCES.

----- SPACE SHUTTLE LDEF-A, BRANDHORST, JR.-----

INVESTIGATION NAME- ADVANCED PHOTOVOLTAIC EXPERIMENT

NSSDC ID- SSLDEF -02 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - M.W. BRANDHORST, JR. NASA-LERC
OI - A.F. FORESTIERI NASA-LERC

BRIEF DESCRIPTION
THIS EXPERIMENT IS FLOWN TO INVESTIGATE THE EFFECT OF SPACE EXPOSURE ON NEW SOLAR CELL AND ARRAY MATERIALS, TO EVALUATE THEIR PERFORMANCE, AND TO MEASURE LONG-TIME VARIATIONS IN THE SPECTRAL CONTENT OF SUNLIGHT. SOLAR CELLS ARE CALIBRATED FOR SPACE USE.

----- SPACE SHUTTLE LDEF-A, BUCKER-----

INVESTIGATION NAME- FREE FLYER BIOSTACK

NSSDC ID- SSLDEF -50 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - M. BUCKER DFVLR

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO INVESTIGATE THE BIOLOGICAL EFFECT OF THE STRUCTURED COMPONENTS OF COSMIC RADIATION DURING SPACE FLIGHT, WITH EMPHASIS ON THE EFFECTS OF INDIVIDUAL VERY HEAVY IONS. QUANTITATIVE ASSESSMENT OF THE HAZARDS OF HEAVY ION PARTICLES TO MAN IN SPACE PERMITS THE ESTABLISHMENT OF SUITABLE PROTECTION GUIDELINES FOR MAN AND BIOLOGICAL EXPERIMENTS IN THE FUTURE SPACE FLIGHTS.

----- SPACE SHUTTLE LDEF-A, CALHOUN-----

INVESTIGATION NAME- CASCADE VARIABLE CONDUCTANCE HEAT PIPE

NSSDC ID- SSLDEF -39 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - L.D. CALHOUN MCDONNELL-DOUGLAS CORP

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO VERIFY THE CAPABILITY OF A VARIABLE-CONDUCTANCE HEAT PIPE SYSTEM TO PROVIDE PRECISE TEMPERATURE CONTROL OF LONG-LIFE SPACECRAFT, WITHOUT NEED OF FEEDBACK HEATER OR OTHER POWER SOURCES FOR TEMPERATURE ADJUSTMENT, UNDER CONDITIONS OF WIDELY VARYING POWER INPUT AND SPACE ENVIRONMENT.

----- SPACE SHUTTLE LDEF-A, CALLEN-----

INVESTIGATION NAME- SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS

NSSDC ID- SSLDEF -08 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - W.R. CALLEN GEORGIA INST OF TECH
OI - T.K. GAYLORD GEORGIA INST OF TECH

BRIEF DESCRIPTION
THE EFFECT OF LONG SPACE EXPOSURE ON ELECTRO-OPTIC CRYSTALS FOR USE IN ULTRA-HIGH CAPACITY SPACE DATA STORAGE AND RETRIEVAL SYSTEMS IS TESTED. THE INFORMATION OBTAINED HELPS DEVELOP HIGH BIT CAPACITY RECORDER AND MEMORY SYSTEMS.

----- SPACE SHUTTLE LDEF-A, CRIFO-----

INVESTIGATION NAME- THIN METAL FILM AND EVAPORATED CATHODES
PERFORMANCE IN SPACE

NSSDC ID- SSLDEF -40 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.F. CRIFO CNRS-LPSP
OI - J.M. BERSET CNRS-LPSP

BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO TEST THE SPACE BEHAVIOR OF
VACUUM UV OPTICAL COMPONENTS (EUV THIN FILMS, UV GAS FILTERS,
PHOTOCATHODES, AND UV CRYSTAL FILTERS) AND TO PROVIDE DATA FOR
THE DEVELOPMENT AND QUALIFICATION OF NEW COMPONENTS.

----- SPACE SHUTTLE LDEF-A, DELASI-----

INVESTIGATION NAME- EFFECTS OF THE SPACE ENVIRONMENT ON THE
PROPERTIES OF METALLIZED DIELECTRICS

NSSDC ID- SSLDEF -20 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R.J. DELASI GRUMMAN AEROSPACE CORP
OI - F. KUENNE GRUMMAN AEROSPACE CORP
OI - M. ROSSI GRUMMAN AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT TESTS THE PERFORMANCE IN THE SPACE
ENVIRONMENT OF METALLIZED DIELECTRIC STRUCTURES WHICH ARE BEING
CONSIDERED FOR DIPOLE ARRAY, TO OBTAIN QUANTITATIVE DATA ON THE
DEGRADATION OF MECHANICAL, OPTICAL AND DIELECTRIC PROPERTIES,
AND TO EVALUATE THE UTILITY OF COATINGS TO PREVENT OR RETARD
DEGRADATION OF THESE STRUCTURES.

----- SPACE SHUTTLE LDEF-A, FELBECK-----

INVESTIGATION NAME- SPACE EXPOSURE INFLUENCE ON MECHANICAL
PROPERTIES OF HI-TOUGHNESS GRAPHITE EPOXY

NSSDC ID- SSLDEF -06 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.K. FELBECK U OF MICHIGAN

BRIEF DESCRIPTION
THIS EXPERIMENT IS FLOWN TO TEST THE EFFECT OF EXTENDED
EXPOSURE TO A SPACE ENVIRONMENT ON THE MECHANICAL PROPERTIES OF
A SPECIALLY TOUGHENED 5208/7300 GRAPHITE-EPOXY COMPOSITE
MATERIAL. SPECIMENS MADE BY RECENTLY DEVELOPED TECHNIQUES OF
INTERMITTENT INTERLAMINAR BONDING ARE EXPOSED AND AFTERWARD
TESTED FOR (1) FRACTURE TOUGHNESS, (2) TENSILE STRENGTH, AND
(3) ELASTIC MODULUS.

----- SPACE SHUTTLE LDEF-A, FILZ-----

INVESTIGATION NAME- PASSIVE COSMIC RADIATION DETECTOR

NSSDC ID- SSLDEF -14 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. FILZ USAF GEOPHYS LAB
OI - R. BEAUJEAN U OF KIEL
OI - P.J. MCNULTY CLARKSON COLL OF TECH
OI - C.L. PEACOCK NASA-MSFC
OI - P.S. YOUNG MISSISSIPPI STATE U

BRIEF DESCRIPTION
A PHOTOGRAPHIC EMULSION PACKAGE IS EXPOSED TO OBTAIN
INFORMATION ON THE FLUX AND ENERGY SPECTRUM OF TRAPPED
RADIATION.

----- SPACE SHUTTLE LDEF-A, FLAMAND-----

INVESTIGATION NAME- RULED AND HOLOGRAPHIC GRATINGS

NSSDC ID- SSLDEF -42 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J. FLAMAND INSTRUMENT SA/JOBIN-R

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO INVESTIGATE THE
LONG-TERM STABILITY OF VARIOUS RULED AND HOLOGRAPHIC GRATINGS
WHICH ARE USED IN SPACECRAFT OPTICAL AND ELECTRO-OPTICAL
INSTRUMENTS.

----- SPACE SHUTTLE LDEF-A, GREGORY-----

INVESTIGATION NAME- THE INTERACTION OF ATOMIC OXYGEN WITH
SOLID SURFACES AT ORBITAL ALTITUDE

NSSDC ID- SSLDEF -19 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.C. GREGORY U OF ALABAMA
OI - P.M. PETERS NASA-MSFC

BRIEF DESCRIPTION
THE MAIN OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE
WHAT EFFECTS FROM THE IMPINGEMENT OF HIGH FLUXES OF ATOMIC
OXYGEN ON VARIOUS SOLID SURFACES ARE MEASURABLE AND TO
INVESTIGATE THE MECHANISMS OF INTERACTION. THIS IS
ACCOMPLISHED BY USING A WIDE VARIETY OF MATERIALS, SOME NOT
CHEMICALLY AFFECTED BY OXYGEN, AND ALTERING THE EXPOSURE, ANGLE
OF INCIDENCE, AND TEMPERATURE OF THE SUBSTRATES BY THEIR
POSITION ON THE LDEF SPACECRAFT AND BY EXPERIMENT DESIGN.

----- SPACE SHUTTLE LDEF-A, HICKEY-----

INVESTIGATION NAME- PASSIVE EXPOSURE OF EARTH RADIATION
BUDGET EXPERIMENT COMPONENTS

NSSDC ID- SSLDEF -27 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.R. HICKEY EPPLEY LAB, INC
OI - F.J. GRIFFIN EPPLEY LAB, INC

BRIEF DESCRIPTION
EARTH RADIATION BUDGET (ERB) EXPERIMENTS REQUIRE
ACCURACIES IN SOLAR AND EARTH FLUX RADIATION MEASUREMENTS IN
FRACTIONAL PERCENTAGES. THIS EXPERIMENT EXPOSES ERB CHANNEL
COMPONENTS, THEN RETRIEVES AND RESUBMITS THEM TO RADIONETRIC
CALIBRATION. CORRECTIONS ARE APPLIED TO ERB RESULTS.
INFORMATION IS OBTAINED TO HELP SELECT COMPONENTS FOR FUTURE
SOLAR AND ERB EXPERIMENTS.

----- SPACE SHUTTLE LDEF-A, HORIZ-----

INVESTIGATION NAME- CHEMISTRY OF MICROMETEORIODS

NSSDC ID- SSLDEF -51 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL
PI - F. HORIZ NASA-JSC
OI - D.S. HICKAY NASA-JSC
OI - D.A. MORRISON NASA-JSC
OI - D.E. BROWNLEE U OF WASHINGTON
OI - R.M. HOUSLEY ROCKWELL INTL CORP

BRIEF DESCRIPTION
THE OBJECTIVE OF THE EXPERIMENT IS TO OBTAIN CHEMICAL
ANALYSIS OF A STATISTICALLY SIGNIFICANT NUMBER OF
MICROMETEORIODS. INFORMATION REGARDING THEIR DENSITY, SHAPE,
AND MASS FLUX IS ALSO OBTAINED.

----- SPACE SHUTTLE LDEF-A, HUMES-----

INVESTIGATION NAME- SPACE DEBRIS IMPACT STUDY

NSSDC ID- SSLDEF -36 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.H. HUMES NASA-LARC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO DETERMINE THE TYPE AND
DEGREE OF DAMAGE WHICH IS EXPECTED FROM METEOROID IMPACTS ON
EXPOSED TARGETS OF SEVERAL DIFFERENT CONFIGURATIONS. THESE
DATA SHOULD HELP IN THE DESIGN OF FUTURE SPACECRAFT WHICH,
BECAUSE OF THEIR SIZES AND EXPECTED LIFETIMES, WOULD OTHERWISE
HAVE HIGH PROBABILITIES OF DAMAGE CAUSED BY METEOROID IMPACTS.

----- SPACE SHUTTLE LDEF-A, JOHNSTON-----

INVESTIGATION NAME- FIBER OPTICS EXPERIMENT

NSSDC ID- SSLDEF -03

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A.R. JOHNSTON

NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES LONG-TERM DEGRADATION OF FIBER OPTIC DATA TRANSMISSION EQUIPMENT AND QUALIFIES DESIGNS FOR MOUNTING TECHNIQUES, TERMINAL COUPLING, AND SHEATHS. FIBER OPTIC TRANSMISSION LINES ARE REQUIRED FOR FUTURE SATELLITES BECAUSE OF THEIR LARGE BANDWIDTHS, LACK OF ELECTROMAGNETIC INTERFERENCE PROBLEMS, LOW WEIGHT AND COST, AND SAFETY.

----- SPACE SHUTTLE LDEF-A, LAVOI-----

INVESTIGATION NAME- LARGE SPACE STRUCTURE LIGHTING
EVALUATION

NSSDC ID- SSLDEF -07

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - P.A. LAVOI

OI - E.J. REINBOLT

ILC TECHNOLOGY INC
NASA-MSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN DATA WHICH PROVIDE A BASIS TO CONFIDENTLY SELECT LIGHTS FOR FUTURE LONG-DURATION SPACE APPLICATIONS, SUCH AS LARGE SPACE STRUCTURES. PRESENT STATE-OF-THE-ART LIGHTS ARE PLACED IN THE SPACE ENVIRONMENT WITH APPROPRIATE INSTRUMENTATION. A BASIC KNOWLEDGE OF THE OPERATION OF CONFINED PLASMA WITHOUT MODIFICATION BY CONVECTION WILL LEAD TO SIGNIFICANTLY IMPROVED LAMPS DESIGNED FOR TERRESTRIAL USE.

----- SPACE SHUTTLE LDEF-A, LIND-----

INVESTIGATION NAME- GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW
GRAVITY

NSSDC ID- SSLDEF -17

INVESTIGATIVE PROGRAM
CODE RS/CO-OP

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - M.D. LIND

OI - K.F. NIELSEN

ROCKWELL INTER SCI CTR
TECH U OF DENMARK

BRIEF DESCRIPTION

THIS EXPERIMENT TESTS A NOVEL METHOD FOR GROWING CRYSTALS FROM SOLUTIONS. THIS METHOD CONSISTS OF ALLOWING TWO OR MORE REALITY SOLUTIONS TO DIFFUSE SLOWLY TOWARDS EACH OTHER IN A REGION OF PURE SOLVENT IN WHICH THEY REACT TO FORM SINGLE CRYSTALS OF A DESIRED SUBSTANCE. SEVERAL CRYSTALS OF IMPORTANCE IN RESEARCH AND TECHNOLOGY ARE OF INTEREST.

----- SPACE SHUTTLE LDEF-A, LIND-----

INVESTIGATION NAME- INTERSTELLAR GAS

NSSDC ID- SSLDEF -08

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - D.L. LIND

OI - J. GEISS

OI - F. BUHLER

NASA-JSC

U OF BERNE

U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO ANALYZE THE INTERSTELLAR NOBLE GAS ATOMS WHICH PENETRATE THE HELIOSPHERE TO THE VICINITY OF THE EARTH. BY COLLECTING THESE PARTICLES AT SEVERAL LOCATIONS IN THE EARTH'S ORBIT, IT IS POSSIBLE TO STUDY THE DYNAMICS OF THE INTERSTELLAR WIND AS IT FLOWS THROUGH THE HELIOSPHERE AND INTERACTS WITH THE SOLAR PHOTON FLUX AND SOLAR WIND. THE EXPERIMENT ALSO INVESTIGATES CHARACTERISTICS OF THE INTERSTELLAR MEDIUM OUTSIDE THE REGION OF THE SOLAR SYSTEM.

----- SPACE SHUTTLE LDEF-A, MALHERBE-----

INVESTIGATION NAME- VACUUM DEPOSITED OPTICAL COATINGS

NSSDC ID- SSLDEF -01

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A. MALHERBE

MATRA/SFOM OPTICAL DIV

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO INVESTIGATE THE LONG-TERM STABILITY OF A WIDE RANGE OF VACUUM-DEPOSITED OPTICAL COATINGS WHICH ARE USED IN SPACECRAFT OPTICAL AND ELECTRO-OPTICAL INSTRUMENTS.

----- SPACE SHUTTLE LDEF-A, MANDEVILLE-----

INVESTIGATION NAME- STUDY OF METEOROID IMPACT CRATERS ON
VARIOUS MATERIAL

NSSDC ID- SSLDEF -32

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.C. MANDEVILLE

CERT/ONERA

BRIEF DESCRIPTION

THE MAIN GOAL OF THIS EXPERIMENT IS TO STUDY IMPACT MICROCRATERS PRODUCED BY MICROMETEOR IMPACTS ON SELECTED MATERIALS (METALS, GLASSES, MINERALS) IN THE FORM OF THICK TARGETS. INTERPLANETARY DUST PARTICLES ARE EXPECTED TO FORM WELL-DEFINED CRATERS UPON IMPACTING THE EXPOSED MATERIALS AT VERY HIGH VELOCITY. THE STUDY OF CRATER FREQUENCY AND IMPACT FEATURES PRIMARILY GIVES DATA ON MASS-FLUX DISTRIBUTION OF MICROMETEORIDS, AND TO A LESSER EXTENT PROVIDES VELOCITY MAGNITUDE AND DIRECTION.

----- SPACE SHUTTLE LDEF-A, MANDEVILLE-----

INVESTIGATION NAME- DUST DEBRIS COLLECTION WITH STACKED
DETECTORS

NSSDC ID- SSLDEF -33

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
DUST

PERSONNEL

PI - J.C. MANDEVILLE

CERT/ONERA

BRIEF DESCRIPTION

THE AIM OF THIS EXPERIMENT IS TO INVESTIGATE, PRIMARILY, THE FEASIBILITY FOR FUTURE MISSIONS OF MULTILAYER THIN FILM DETECTORS ACTING AS ENERGY SORTERS IN ORDER TO COLLECT MICROMETEORIDS, IF NOT IN THEIR ORIGINAL SHAPE, AT LEAST AS FRAGMENTS SUITABLE FOR CHEMICAL ANALYSIS.

----- SPACE SHUTTLE LDEF-A, MCDONNELL-----

INVESTIGATION NAME- MULTIPLE FOIL MICROABRASION
PACKAGE

NSSDC ID- SSLDEF -31

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.A.M. MCDONNELL

OI - D.G. ASHWORTH

OI - W.C. CARFY

OI - R.P. FLAVILL

OI - R.C. JENNISON

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BRIEF DESCRIPTION

THIS EXPERIMENT EVALUATES THE NEAR-EARTH PICO-PARTICLE ENVIRONMENT BY PENETRATION OF MICROMETER THICKNESS MULTIPLE-FOIL ARRAYS. RELIABLE DEFINITION OF THE SIZE, VELOCITY AND DISTRIBUTION OF THE NEAR-EARTH SOLID PARTICLE ENVIRONMENT AND PARTICLE COMPOSITION ANALYSIS SUPERSEDES RESULTS OBTAINED FROM OTHER RELATED PASSIVE EXPERIMENTS.

----- SPACE SHUTTLE LDEF-A, MCINTOSH, JR.-----

INVESTIGATION NAME- LOW TEMPERATURE HEAT PIPE EXPERIMENT

NSSDC ID- SSLDEF -12

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R. MCINTOSH, JR. NASA-BSFC
OI - S. OLLENDORF NASA-BSFC
OI - C.R. MCCREIGHT NASA-ARC

BRIEF DESCRIPTION
THIS EXPERIMENT EVALUATES THE PERFORMANCE CHARACTERISTICS IN THE SPACE ENVIRONMENT OF A FIXED CONDUCTANCE TRANSPORTER HEAT PIPE, A THERMAL DIODE HEAT PIPE, AND A LOW-TEMPERATURE PHASE CHANGE MATERIAL.

----- SPACE SHUTTLE LDEF-A, NICHOLS-----

INVESTIGATION NAME- EFFECTS OF SOLAR RADIATION ON GLASSES

NSSDC ID- SSLDEF -44 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R.L. NICHOLS NASA-MSFC
OI - D.L. KINSEY VANDERBILT U

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE EFFECTS OF SOLAR RADIATION AND THE SPACE ENVIRONMENT ON THE OPTICAL, MECHANICAL, AND CHEMICAL PROPERTIES OF VARIOUS GLASSES.

----- SPACE SHUTTLE LDEF-A, O'SULLIVAN-----

INVESTIGATION NAME- HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS

NSSDC ID- SSLDEF -49 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL
PI - D. O'SULLIVAN DUBLIN INST ADV STUDY
OI - C.O. CEALLAIGH DUBLIN INST ADV STUDY
OI - A. THOMPSON DUBLIN INST ADV STUDY
OI - K.P. WENZEL ESA-ESTEC
OI - V. DOMINGO ESA-ESTEC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO STUDY CHARGE AND ENERGY SPECTRA OF COSMIC RAY NUCLEI, SUPER HEAVY NUCLEI, AND HEAVY ANTINUCLEI. THE INFORMATION PROVIDED ASSISTS IN UNDERSTANDING THE PHYSICAL PROCESSES OF COSMIC RAY NUCLEI PRODUCTION AND ACCELERATION AT THE SOURCE IN INTERSTELLAR SPACE. INFORMATION CONCERNING NUCLEOSYNTHESIS IS ALSO OBTAINED.

----- SPACE SHUTTLE LDEF-A, PAILLOUS-----

INVESTIGATION NAME- THERMAL COATINGS AND STRUCTURAL MATERIAL

NSSDC ID- SSLDEF -34 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - A. PAILLOUS CERT/OMERA
OI - J.C. GUILLAUMON CNES/CST

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO EXAMINE THE VALIDITY OF GROUND SIMULATIONS OF THE SPACE ENVIRONMENT FOR STUDIES OF DEGRADATION OF THERMAL CONTROL COATINGS USED ON SATELLITES. COMPARISON IS MADE OF SAMPLE DEGRADATIONS FROM BOTH GROUND TESTS AND ACTUAL FLIGHT TESTS.

----- SPACE SHUTTLE LDEF-A, POWELL-----

INVESTIGATION NAME- GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE

NSSDC ID- SSLDEF -35 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.W. POWELL ROCKWELL INTL CORP
OI - D.W. WELCH ROCKWELL INTL CORP

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVE OF GRAPHITE/POLYIMIDE TESTING IS TO ACCUMULATE ACTUAL OPERATIONAL DATA IN THE SPACE ENVIRONMENT OVER LONG PERIODS OF TIME. FROM THESE DATA, DESIGN CRITERIA ASSOCIATED WITH MECHANICAL PROPERTIES OF FUTURE LIGHTWEIGHT SPACE-ORIENTED STRUCTURAL COMPONENTS ARE ESTABLISHED. THE PRIMARY OBJECTIVE OF THE GRAPHITE/EPOXY SANDWICH TESTING IS TO ACCUMULATE ACTUAL OPERATIONAL DATA ASSOCIATED WITH LONG-DURATION ORBITAL EXPOSURE AND TO VALIDATE MECHANICAL PROPERTIES (KNOCK-DOWN FACTORS) AS APPLIED TO THE DESIGN/ANALYSIS OF THE EXISTING SPACE SHUTTLE GRAPHITE/EPOXY

PAYLOAD BAY DOOR.

----- SPACE SHUTTLE LDEF-A, PREUSS-----

INVESTIGATION NAME- CRITICAL SURFACE DEGRADATION EFFECTS ON COATINGS AND SOLAR CELLS

NSSDC ID- SSLDEF -46 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - L. PREUSS MDD SPACE DIV

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO INVESTIGATE THE COMBINED EFFECTS OF RADIATION AND CONTAMINATION ON DIFFERENT THERMAL COATINGS AND SOLAR CELLS WITH AND WITHOUT CONDUCTIVE LAYERS TO PROVIDE DESIGN CRITERIA, TECHNIQUES AND TEST METHODS TO ENSURE CONTROL OF COMBINED SPACE AND SPACECRAFT ENVIRONMENTAL EFFECTS. THIS EXPERIMENT ALSO PROVIDES QUALIFICATION FOR A NUMBER OF NEW COATINGS AND SOLAR CELLS.

----- SPACE SHUTTLE LDEF-A, RAND-----

INVESTIGATION NAME- BALLOON MATERIALS DEGRADATION

NSSDC ID- SSLDEF -38 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.L. RAND TEXAS A&M

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO ASSESS THE EFFECTS OF LONG-TERM EXPOSURE OF CANDIDATE BALLOON FILMS, TAPES, AND LINES TO THE SPACE ENVIRONMENT. DEGRADATION OF MECHANICAL AND RADIO-METRIC PROPERTIES IS OBSERVED BY A SERIES OF TESTS ON THE EXPOSED MATERIALS.

----- SPACE SHUTTLE LDEF-A, ROBERTSON-----

INVESTIGATION NAME- EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS

NSSDC ID- SSLDEF -18 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.B. ROBERTSON NASA-LARC
OI - I.O. CLARK NASA-LARC
OI - R.K. CROUCH NASA-LARC

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE EFFECT OF LONG-DURATION SPACE EXPOSURE AND LAUNCH ENVIRONMENT ON THE PERFORMANCE OF PYROELECTRIC DETECTORS. PERFORMANCE PARAMETERS (RESPONSIVITY, DETECTIVITY, AND SPECTRAL RESPONSE) AND MATERIALS PROPERTIES (PYROELECTRIC COEFFICIENT AND DIELECTRIC LOSS TANGENT) ARE MEASURED BEFORE AND AFTER EXPOSURE.

----- SPACE SHUTTLE LDEF-A, ROBINSON, JR.-----

INVESTIGATION NAME- TRANSVERSE FLAT PLATE HEAT PIPE PERFORMANCE

NSSDC ID- SSLDEF -37 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - G.A. ROBINSON, JR. NASA-MSFC
OI - F. EDELSTEIN GRUMMAN AEROSPACE CORP

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT IS TO DEMONSTRATE THE LONG-TERM OPERATION OF A HIGH-CAPACITY LIGHTWEIGHT HEAT PIPE IN A SUSTAINED ZERO-GRAVITY ENVIRONMENT. THE EXPERIMENT ALSO TESTS THE ABILITY OF THE HEAT PIPE TO REPRIME IN ZERO GRAVITY.

----- SPACE SHUTTLE LDEF-A, SCHALL-----

INVESTIGATION NAME- SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS

NSSDC ID- SSLDEF -15 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
 PI - P. SCHALL AEROSPACE CORP
 OI - E.M. BORSON AEROSPACE CORP
 OI - M.F. AMATEAU AEROSPACE CORP

BRIEF DESCRIPTION

MATERIALS SPECIMENS ARE ANALYZED TO UNDERSTAND CHANGES IN PROPERTIES AND STRUCTURE AFTER EXPOSURE TO SPACE ENVIRONMENT. THE EXPERIMENT INCLUDES THE INVESTIGATION OF VARIOUS STRUCTURAL MATERIALS, SOLAR POWER COMPONENTS, THERMAL CONTROL MATERIALS, LASER COMMUNICATION COMPONENTS, LASER MIRROR COATINGS, LASER-HARDENED MATERIALS, ANTENNA MATERIALS, AND ADVANCED COMPOSITES.

----- SPACE SHUTTLE LDEF-A, SCOTT, JR.-----

INVESTIGATION NAME- ATOMIC OXYGEN STIMULATED OUTGASSING

NSSDC ID- SSLDEF -07 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - R.L. SCOTT, JR. SOUTHERN U
 OI - R.C. LINTON NASA-MSFC

BRIEF DESCRIPTION

THE EFFECT OF OXYGEN IMPINGEMENT ON THERMAL CONTROL SURFACES IN NEAR-EARTH ORBIT IS INVESTIGATED WITH REGARD TO THE PRODUCTION OF OPTICALLY DAMAGING OUTGASSING PRODUCTS. THE BIDIRECTIONAL REFLECTANCE OF SELECTED COATINGS IS MEASURED BEFORE AND AFTER SPACE EXPOSURE. DATA HELP DETERMINE IF ATOMIC OXYGEN IMPINGEMENT WAS A MAJOR FACTOR IN UNEXPLAINED SKYLAB CONTAMINATION BY PROVIDING AN UNDERSTANDING OF THE EFFECT OF ATOMIC OXYGEN ON THERMAL CONTROL SURFACES.

----- SPACE SHUTTLE LDEF-A, SEELEY-----

INVESTIGATION NAME- HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS

NSSDC ID- SSLDEF -23 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J.S. SEELEY READING U
 OI - A. WHATLEY READING U
 OI - R. HUNNEMAN READING U

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO EXPOSE TO THE SPACE ENVIRONMENT INFRARED MULTILAYER INTERFERENCE FILTERS OF NOVEL DESIGN, CONSTRUCTION, AND MANUFACTURE, WHICH ARE USEFUL IN SENSING ATMOSPHERIC TEMPERATURE AND COMPOSITION. OPTICAL BEHAVIOR OF THESE FILTERS UNDER RADIATION IS NOT KNOWN AND IS CRITICAL TO THEIR PERFORMANCE.

----- SPACE SHUTTLE LDEF-A, SELLEN, JR.-----

INVESTIGATION NAME- SPACE PLASMA-HIGH VOLTAGE DRAINAGE

NSSDC ID- SSLDEF -09 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J.M. SELLEN, JR. TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT IS PLANNED TO DETERMINE THE LONG-TERM CURRENT DRAINAGE PROPERTIES OF THIN DIELECTRIC FILMS SUBJECTED TO HIGH-LEVEL ELECTRIC STRESS IN THE PRESENCE OF THE AMBIENT PLASMA AND SOLAR RADIATION. OBSERVED BEHAVIOR OF THESE FILMS WILL ESTABLISH ALLOWABLE LONG-TERM ELECTRIC STRESS LEVELS FOR SUCH FILMS, AS APPLIED TO SOLAR ARRAY AND SPACECRAFT THERMAL CONTROL COATING MATERIALS.

----- SPACE SHUTTLE LDEF-A, SHAPIRO-----

INVESTIGATION NAME- HEAVY IONS IN SPACE

NSSDC ID- SSLDEF -13 INVESTIGATIVE PROGRAM
 CODE SC
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - M.M. SHAPIRO US NAVAL RESEARCH LAB
 OI - F.W. O'DELL US NAVAL RESEARCH LAB
 OI - R. SILBERBERG US NAVAL RESEARCH LAB
 OI - C.M. TSAO US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

A STACK OF PASSIVE TRACK DETECTORS, INTERLEAVED WITH HEAVY METAL LAYERS, IS USED TO INVESTIGATE THE THREE COMPONENTS OF HEAVY NUCLEI IN SPACE (LOW-ENERGY NUCLEI N, O, NE, THE HEAVY NUCLEI OF THE VAN ALLEN BELTS, AND THE ULTRA-HEAVY NUCLEI, Z .GT. 30, OF THE GALACTIC COSMIC RADIATION).

----- SPACE SHUTTLE LDEF-A, SINGER-----

INVESTIGATION NAME- INTERPLANETARY DUST

NSSDC ID- SSLDEF -52 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 INTERPLANETARY DUST

PERSONNEL
 PI - S.F. SINGER U OF VIRGINIA
 OI - P. KASSEL, JR. NASA-LARC
 OI - J. STANLEY U OF VIRGINIA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO MEASURE THE IMPACT RATE AND DIRECTION OF SOLID PARTICLES, WITH SOME DISCRIMINATION AS TO THEIR MASS AND VELOCITY IN LOW-EARTH ORBIT. THE INSTRUMENT CONSISTS OF SIX GROUPS OF DETECTORS MOUNTED ON THE LDEF, PERMITTING THE DETECTION OF DUST IMPACTING FROM ALL DIRECTIONS. EACH GROUP OF DETECTORS WILL HAVE AN ACTIVE DETECTION SURFACE AREA OF .106 SQ M (2 SQ FT).

----- SPACE SHUTTLE LDEF-A, SLEMP-----

INVESTIGATION NAME- THERMAL CONTROL SURFACES(PASSIVE)

NSSDC ID- SSLDEF -05 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - W.S. SLEMP NASA-LARC
 OI - R.A. BABCOCK, 3RD NASA-LARC

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE EXPOSURE TO NEW COATINGS BEING DEVELOPED FOR SPACECRAFT THERMAL CONTROL. SAMPLES OF PAINTS, OTHER COATINGS AND SECOND-SURFACE MIRRORS ARE EXPOSED, SOME TO ALL ENVIRONMENTS OF THE MISSION AND SOME TO ONLY SPECIFIC ENVIRONMENTS. SPECTRAL REFLECTANCE OF THE SAMPLES IS MEASURED BEFORE AND AFTER THE MISSION.

----- SPACE SHUTTLE LDEF-A, SLEMP-----

INVESTIGATION NAME- SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT

NSSDC ID- SSLDEF -21 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - W.S. SLEMP NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO EVALUATE THE EFFECTS OF THE NEAR-EARTH ORBITAL ENVIRONMENT ON THE PHYSICAL AND CHEMICAL PROPERTIES OF COMPOSITE MATERIALS.

----- SPACE SHUTTLE LDEF-A, TAYLOR-----

INVESTIGATION NAME- SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS

NSSDC ID- SSLDEF -16 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - E.W. TAYLOR USAF WEAPONS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO QUALIFY FIBER OPTIC LINKS FOR FUTURE SPACE APPLICATIONS, AND TO DOCUMENT AND ANALYZE THE EFFECT OF THE NATURAL SPACE ENVIRONMENT ON LINK AND COMPONENT PERFORMANCE.

----- SPACE SHUTTLE LDEF-A, TENNYSON-----

INVESTIGATION NAME- PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT

NSSDC ID- SSLDEF -24

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.C. TENNYSON
OI - J.S. HANSEN

U OF TORONTO
U OF TORONTO

BRIEF DESCRIPTION

BY VARYING THE TIMES OF EXPOSURE TO THE SPACE ENVIRONMENT, THE CHANGES IN THE MECHANICAL PROPERTIES OF SEVERAL LIGHTWEIGHT COMPOSITE MATERIALS, INCLUDING GRAPHITE, BORON, S-GLASS, AND PRO-49 ARE STUDIED. PROPERTY DEGRADATION CAUSED BY MATRIX BREAKDOWN, OUTGASSING, THERMAL STRESSES, AND INTERNAL VOID CRACKS MUST BE KNOWN ABOUT THESE MATERIALS. ACTUAL SPECIMEN TEST RESULTS FROM SPACE ARE CORRELATED WITH GROUND TEST DATA AT AMBIENT CONDITIONS AND IN A THERMAL-VACUUM CHAMBER.

----- SPACE SHUTTLE LDEF-A, VENABLES-----

INVESTIGATION NAME- RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT

NSSDC ID- SSLDEF -22

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.D. VENABLES
OI - J.S. ANEARN

MARTIN-MARIETTA LABS
MARTIN-MARIETTA LABS

BRIEF DESCRIPTION

THIS EXPERIMENT OBTAINS INFORMATION ON PREDICTING AND IMPROVING THE RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS. THE EFFECTS OF EXPOSURE TO AN ORBITAL RADIATION ENVIRONMENT ARE COMPARED WITH RESULTS USING A TRANSMISSION ELECTRON MICROSCOPE. RADIATION-INDUCED FREQUENCY DRIFTS AND ACOUSTIC ABSORPTION IN THESE OSCILLATORS MUST BE MINIMIZED TO AVOID UNDESIRABLE VARIATIONS IN HIGH-PRECISION CLOCKS IN SATELLITES AND MISSILES. DATA OBTAINED FROM LDEF AND GROUND EXPERIMENTS PROVIDE GUIDES TO IMPROVE THE RADIATION HARDNESS OF THESE COMPONENTS.

----- SPACE SHUTTLE LDEF-A, WHITAKER-----

INVESTIGATION NAME- SOLAR ARRAY MATERIALS (PASSIVE)

NSSDC ID- SSLDEF -45

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A.F. WHITAKER
OI - C.F. SMITH, JR.
OI - L.E. YOUNG
OI - H.W. BRANDHORST, JR.
OI - A.F. FORESTIERI
OI - E.N. COSTOGUE
OI - E.M. GADY
OI - J.A. BASS

NASA-MSFC
NASA-MSFC
NASA-MSFC
NASA-LERC
NASA-LERC
NASA-JPL
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE ON MECHANICAL, ELECTRICAL, AND OPTICAL PROPERTIES OF CANDIDATE LIGHTWEIGHT SOLAR ARRAY MATERIALS SUCH AS THOSE NEEDED FOR A SPACE STATION, A SATELLITE POWER STATION, AND SOLAR ELECTRIC PROPULSION SOLAR ARRAYS. DATA OBTAINED ON THE COMBINED EFFECTS OF ULTRAVIOLET, PENETRATING RADIATION AND VACUUM ON THESE MATERIAL PROPERTIES ALLOW SPACECRAFT MANUFACTURERS TO DESIGN SOLAR ARRAYS WITH MORE PREDICTABLE LIFETIMES.

----- SPACE SHUTTLE LDEF-A, WILKES-----

INVESTIGATION NAME- THERMAL CONTROL SURFACES

NSSDC ID- SSLDEF -04

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.R. WILKES
OI - M.M. KING

NASA-MSFC
NASA-MSFC

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE EXPOSURE ON NEW COATINGS DEVELOPED FOR SPACECRAFT THERMAL CONTROL. SAMPLES ARE MOUNTED ON AN INDEXING WHEEL WITH A REFLECTOMETER THAT PERIODICALLY RECORDS REFLECTANCE VALUES IN SPACE.

***** SPACELAB 1*****

SPACECRAFT COMMON NAME- SPACELAB 1
ALTERNATE NAMES-

NSSDC ID- SPALAB1

LAUNCH DATE- 06/06/83

WEIGHT- 14500. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

INTERNATIONAL
UNITED STATES

ESA
NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 89.4 MIN
PERIAPSIS- 250. KM ALT

INCLINATION- 57. DEG
APOAPSIS- 250. KM ALT

PERSONNEL

RM - R.E. PACE
MS - C.R. CHAPPELL
MG - M.J. SMITH
SC - M. WISKERCHEN
PM - O.C. JEAN

NASA-MSFC
NASA-MSFC
NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-MSFC

BRIEF DESCRIPTION

THE FIRST SPACELAB MISSION IS A JOINT NASA AND EUROPEAN SPACE AGENCY (ESA) MISSION. SPACELAB 1 CONSISTS OF A PRESSURIZED COMPARTMENT (MODULE) FOR HOUSING EQUIPMENT AND FLIGHT PERSONNEL AND A SPACE-EXPOSED PLATFORM TO ACCOMMODATE INSTRUMENTS. THE COMPARTMENT AND PLATFORM ARE FLOWN INTO SPACE AND RETURNED INSIDE THE PAYLOAD COMPARTMENT OF THE SPACE SHUTTLE ORBITER. THE MISSION IS PLANNED TO LAST 7 DAYS, AND WHILE IN SPACE, THE ORBITER PAYLOAD COMPARTMENT DOORS ARE OPENED TO ALLOW VIEWING OF THE EARTH, SUN, AND DEEP SPACE. THE FOLLOWING INVESTIGATIONS ARE IN THE DEVELOPMENT PHASE: AN IMAGING SPECTROMETRIC OBSERVATORY, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING, FAR-UV OBSERVATIONS USING THE FAUST INSTRUMENT, HZE PARTICLE DOSIMETRY, MUTATION OF HELIANTHUS ANNUUS, VESTIBULAR EXPERIMENTS, INFLUENCE OF SPACE FLIGHT ON ERYTHROKINETICS IN MAN, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS, VESTIBULO-SPINAL REFLEX MECHANISMS, EFFECTS ON PROLONGED WEIGHTLESSNESS, GEOPHYSICAL FLUID FLOW, WETTING-SPREADING AND OPERATING CHARACTERISTICS OF BEARING LUBRICANTS IN A ZERO-GRAVITY ENVIRONMENT, TRIBOLOGICAL STUDIES OF FLUID-LUBRICATED JOURNAL BEARINGS, ACTIVE-CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR, GRILLE SPECTROMETER, WAVES IN THE -OH EMISSION LAYER, TEMPERATURE-WIND IN MESOSPHERE-THERMOSPHERE, H AND D LYMAN ALPHA, SOLAR SPECTRUM FROM 1900 A TO 4 MICROMETERS, LOW-ENERGY ELECTRONS, MAGNETIC FIELD MEASUREMENT, PHENOMENA INDUCED BY CHARGED-PARTICLE BEAMS, SOLAR CONSTANT, VERY WIDE FIELD CAMERA, X-RAY SPECTROSCOPY, HEAVY COSMIC-RAY ISOTOPES, VESTIBULAR SLED, SLED EXPERIMENTS, LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS, MASS DISCRIMINATION, MEASUREMENT OF INTRATHORACIC BLOOD PRESSURE, ADVANCED BIOSTACK, 3-DIMENSIONAL BALLISTOCARDIOGRAPHY, EFFECT OF RADIATION, ELECTROPHYSIOLOGICAL TAPE RECORDER, COLLECTION OF BLOOD SAMPLES, MATERIAL SCIENCE FACILITY, METRIC CAMERA, AND MICROWAVE SCATTEROMETER-RADIOMETER.

----- SPACELAB 1, ACKERMAN-----

INVESTIGATION NAME- GRILLE SPECTROMETER

NSSDC ID- SPALAB1-18

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M. ACKERMAN
OI - D. FRIMONT
OI - A. GIRARD

BIRA
BIRA
ONERA

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO DETERMINE THE VERTICAL DISTRIBUTION PROFILES OF TRACE CONSTITUENTS IN THE STRATOSPHERE, MESOSPHERE AND THERMOSPHERE IN ORDER TO STUDY THE CHEMICAL AND DYNAMICAL ATMOSPHERIC PROCESSES, AND (2) TO MONITOR, ON A LONG-TERM BASIS, MAN-MADE AND NATURAL ALTERATIONS OF THE NEAR-EARTH ENVIRONMENT. THE EQUIPMENT CONTAINS AN INFRARED SPECTROMETER WITH A TELESCOPE AND A COOLED INFRARED DETECTOR. THE SPECTROMETER OPERATES IN THE WAVELENGTH RANGE FROM 2.5 TO 15 MICROMETERS.

----- SPACELAB 1, ANDRESEN-----

INVESTIGATION NAME- ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER

NSSDC ID- SPALAB1-28

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.D. ANDRESEN
 01 - R.L.F. BOYD
 01 - G. BROWLIE
 01 - J.L. CULHANE
 01 - J. IVES
 01 - P.W. SANFORD
 01 - A. PEACOCK
 01 - B.G. TAYLOR
 01 - G. BOELLA
 01 - S. SALENI
 01 - L. SCARSI
 01 - G. VILLA

ESA-ESTEC
 U COLLEGE LONDON
 U COLLEGE LONDON
 U COLLEGE LONDON
 U COLLEGE LONDON
 U COLLEGE LONDON
 ESA-ESTEC
 ESA-ESTEC
 U OF MILAN
 U OF PALERMO
 U OF PALERMO
 U OF MILAN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO USE A GAS SCINTILLATION PROPORTIONAL COUNTER (1.5-50 KEV, 5-DEG FIELD OF VIEW, LESS THAN 10 PERCENT RESOLUTION AT 6 KEV) TO MEASURE SPECTRAL FEATURES OF GALACTIC X-RAY SOURCES, THE DIFFUSE X-RAY BACKGROUND, CLUSTERS OF GALAXIES, AND THE X-RAY FLUORESCENCE FROM THE EARTH'S ATMOSPHERE, AND (2) TO TEST THE CAPABILITY OF THE COUNTER TO REJECT CHARGED-PARTICLE BACKGROUND RADIATION OF ENERGY NEAR THAT OF WEAK X-RAY SOURCES. THE EQUIPMENT IS A GAS SCINTILLATION COUNTER HAVING A 25-100 MICROMETER BERYLLIUM WINDOW, XENON CHAMBER, PHOTOMULTIPLIER DETECTOR, AND A PULSE-HEIGHT ANALYZER.

----- SPACELAB 1, BEAUJEAN-----

INVESTIGATION NAME- ISOTOPE STACK

NSSDC ID- SPALAB1-29

INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 COSMIC RAYS

PERSONNEL

PI - R. BEAUJEAN
 01 - W. ENGE
 01 - G. SIEGMON

U OF KIEL
 INST P+A NUCLEAR PHYS
 INST P+A NUCLEAR PHYS

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO USE A STACK OF PLASTIC SHEETS TO MEASURE HEAVY COSMIC-RAY NUCLEI (CHARGE Z EQUAL TO OR GREATER THAN 3, 50 MEV PER NUCLEON TO 2 GEV PER NUCLEON), AND TO DETERMINE THE SOURCE, ACCELERATION, PROPAGATION, AND AGE OF COSMIC RAYS. THE EQUIPMENT CONSISTS OF A STACK OF LAYERS OF PLASTIC VISUAL TRACK DETECTORS HOUSED IN A SEALED ALUMINUM CONTAINER.

----- SPACELAB 1, BEGHIN-----

INVESTIGATION NAME- PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS

NSSDC ID- SPALAB1-25

INVESTIGATIVE PROGRAM
 CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 IONOSPHERES

PERSONNEL

PI - C. BEGHIN
 01 - Y. ARNAL
 01 - M. HAMELIN
 01 - D. HENRY
 01 - M. PIRRE
 01 - J.J. BERTHELIER
 01 - J. LAUERENAT
 01 - D.N. MAEHLUM
 01 - J. TROIM
 01 - R. BOSWELL
 01 - A. GONFALONE
 01 - T.R. SANDERSON

CNRS, CTR FOR SPECTROM
 CNRS
 CNRS
 CNRS
 CNRS
 CNRS
 CNRS
 NDRE
 NDRE
 ESA-ESTEC
 ESA-ESTEC
 ESA-ESTEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE ELECTRON AND ION-BEAM GUNS (UP TO 10 KEV), AN ASSOCIATED WAVE RECEIVER (UP TO 100 MHZ), AN ELECTRON-TEMPERATURE PROBE, AND THREE PARTICLE DETECTORS (1) TO STUDY IONOSPHERIC NEUTRALIZATION PROCESSES BY STUDYING THE STABILITY OF THE ELECTRONIC POTENTIAL OF THE GUN WITH RESPECT TO THE PLASMA, (2) TO STUDY PLASMA INSTABILITIES BY MEASURING ELECTRICAL (UP TO 100 MHZ) AND MAGNETIC (200 HZ UP TO 20 MHZ) WAVE COMPONENTS, (3) TO USE THE SHUTTLE MOTION TO PERFORM ION-BOUNCE EXPERIMENTS, (4) TO STUDY THE P+ INTERACTION WITH THE NEUTRAL ATMOSPHERE, AND (5) TO MONITOR THE SECONDARY ELECTRON FLUX. THE EQUIPMENT CONSISTS OF AN ACTIVE PACKAGE CONTAINING AN ELECTRON GUN, AN ION GUN (DEUTERIUM AND XENON), A PARTICLE DETECTOR, AND A PASSIVE PACKAGE CONTAINING AN ELECTRIC ANTENNA, MAGNETIC ANTENNA, AND TWO PARTICLE DETECTORS.

----- SPACELAB 1, BENTON-----

INVESTIGATION NAME- HZE-PARTICLE DOSIMETERY

NSSDC ID- SPALAB1-11

INVESTIGATIVE PROGRAM
 CODE SB

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SPACE BIOLOGY

PERSONNEL

PI - E.V. BENTON
 01 - D.D. PETERSON
 01 - R.W. CASSOU

U OF CALIF, SAN FRANC.
 U OF CALIF, SAN FRANC.
 U OF CALIF, SAN FRANC.

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE TO PROVIDE BASELINE DATA FOR EVALUATION OF RADIATION RISK TO MAN FROM HIGH CHARGE AND ENERGY (HZE) PARTICLES ON THIS AND FUTURE SPACELAB MISSIONS, AND TO CONTINUE A PROGRAM OF DOCUMENTATION OF HZE PARTICLE RADIATION INSIDE MANNED SPACECRAFT WHICH HAS INCLUDED APOLLO, SKYLAB, AND ASTP MISSIONS. THE EQUIPMENT CONSISTS OF (1) A PASSIVE DOSIMETER PACKET CONTAINING PLASTIC NUCLEAR TRACK DETECTORS, AN AGCL CRYSTAL DETECTOR, AND THERMOLUMINESCENT DETECTOR CHIPS, AND (2) A THICK PLASTIC STACK CONSISTING OF 200 LEXAN POLYCARBONATE PLASTIC FILMS.

----- SPACELAB 1, BERTAUX-----

INVESTIGATION NAME- INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA

NSSDC ID- SPALAB1-22

INVESTIGATIVE PROGRAM
 CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.L. BERTAUX
 01 - G. KOCKARTS

CNRS-SA
 IASO

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO USE A LYMAN-ALPHA PHOTOMETER EQUIPPED WITH H AND D ABSORPTION CELLS TO MEASURE DEUTERIUM EMISSION; (2) TO OBSERVE PROTON PRECIPITATION IN THE AUROREAL AND EQUATORIAL ZONES; (3) TO USE A HYDROGEN ABSORPTION CELL AS A TECHNIQUE TO ELIMINATE THE INTERPLANETARY LYMAN-ALPHA BACKGROUND; (4) TO OBSERVE THE SEPAC PROTON-GUN INTERACTION WITH THE STS/SPACELAB ENVIRONMENT; AND (5) TO ATTEMPT TO MEASURE ATMOSPHERIC HYDROGEN LYMAN-ALPHA EMISSIONS. THE EQUIPMENT CONSISTS OF A SPECTROPHOTOMETER WITH AN ATOMIC HYDROGEN ABSORPTION CELL AND AN ATOMIC DEUTERIUM ABSORPTION CELL, AND A SOLAR-BLIND PHOTOMULTIPLIER FOR THE DETECTOR.

----- SPACELAB 1, BOWYER-----

INVESTIGATION NAME- FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT

NSSDC ID- SPALAB1-07

INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL

PI - C.S. BOWYER
 01 - G.C. COURTES
 01 - J.M. DENARVENG
 01 - R. MALINA

U OF CALIF, BERKELEY
 CNRS-LAS
 CNRS-LAS
 U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PERFORM UV (1100-3500 A) BROADBAND IMAGING AND LOW-RESOLUTION (20-200 A) SPECTROSCOPY OF GLOBULAR CLUSTERS, GALACTIC CLUSTERS, QUASI-STELLAR OBJECTS, NEARBY GALAXIES, UV STARS, EXTENDED SOURCES, GEORORONA, AND SPACELAB 1 CONTAMINANTS. THE EQUIPMENT CONSISTS OF A FAR ULTRAVIOLET SPACE TELESCOPE (FAUST) AND AN ELECTRONIC INTERFACE MODULE. THE INSTRUMENT IS AN F/1.12 WYNNIE CAMERA WITH AN EFFECTIVE COLLECTING AREA OF 150 SQ CM AND A FIELD OF VIEW OF 7.5 DEG. THE IMAGING CAPABILITY IS BETTER THAN 2 ARC MINUTES IN THE ENTIRE FIELD OF VIEW. THE DETECTOR SYSTEM USES A MICROCHANNEL PLATE IMAGE INTENSIFIER IN CONJUNCTION WITH A 60-EXPOSURE, 35-MILLIMETER FILM PACK OF KODAK 103AO.

----- SPACELAB 1, BROWN-----

INVESTIGATION NAME- MUTATION OF HELIANTHUS ANNUUS

NSSDC ID- SPALAB1-12

INVESTIGATIVE PROGRAM
 CODE SB

INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL

PI - A.W. BROWN
 01 - A.O. DAML
 01 - D.K. CHAPMAN

U OF PENNSYLVANIA
 U OF PENNSYLVANIA
 U OF PENNSYLVANIA

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE (1) TO DETERMINE QUANTITATIVELY WHETHER THE CONDITION OF SUSTAINED WEIGHTLESSNESS PRODUCES THE SAME DAMPING OR INHIBITING EFFECT ON PLANT MUTATION AS DOES ROTATION ON A HORIZONTAL CLINOSTAT ON EARTH, (2) TO MEASURE THE PERIOD AND AMPLITUDE OF ANY NUTATIONAL OSCILLATIONS BY THE SEEDLINGS WHICH MAY BE OBSERVED UNDER THE CONDITIONS OF SUSTAINED WEIGHTLESSNESS, AND (3) TO GAIN EXPERIENCE IN THE CONDUCT OF A PLANT PHYSIOLOGICAL EXPERIMENT IN A MULTIDISCIPLINARY SPACE LABORATORY IN WHICH DIVERSE FACILITIES ARE TO BE SHARED. THE EQUIPMENT CONSISTS OF A DARK BOX, WITHIN WHICH FOUR TEST PLANTS ILLUMINATED BY INFRARED LIGHT ARE LOCATED IN THE FIELD OF VIEW OF A VIDEO CAMERA; ROTOR COMPARTMENTS; PLANT MODULES; BATTERY PACK; VIDEO TAPE DATA RECORDER; CONTROL ELECTRONICS; AND A CARRY-ON MODULE CONTAINER OF 24 PLANT MODULES.

----- SPACELAB 1, BUCKER-----

INVESTIGATION NAME- ADVANCED BIOSTACK EXPERIMENT

NSSDC ID- SPALAB1-32 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - M. BUCKER DFVLR

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO DETERMINE THE BIOLOGICAL IMPORTANCE OF NUCLEAR DISINTEGRATION STARS, TO ASSESS QUANTITATIVELY THE INTERFERENCE OF HZE PARTICLES WITH OTHER BIOLOGICAL STUDIES IN SPACE, TO DETERMINE THE DISTRIBUTION OF HZE PARTICLES AT DIFFERENT LOCATIONS IN THE MODULE AND ON THE PALLET, AND TO ESTABLISH RADIATION PROTECTION GUIDELINES FOR HUMANS AND BIOLOGICAL EXPERIMENTS IN FUTURE SPACE FLIGHTS. THE EQUIPMENT CONSISTS OF FOUR CYLINDERS WITH LAYERS OF DIFFERENT BIOLOGICAL OBJECTS BETWEEN DIFFERENT TRACK DETECTORS, INTEGRATING DOSIMETERS, AND SPECIALLY SELECTED TRACK DETECTORS.

----- SPACELAB 1, COGOLI-----

INVESTIGATION NAME- LYMPHOCYTE PROLIFERATION IN
WEIGHTLESSNESS

NSSDC ID- SPALAB1-36 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - A. COGOLI U OF ZURICH

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO GAIN FURTHER INFORMATION ON THE TRIGGERING OF THE IMMUNORESPONSE AND ON THE MECHANISM OF EUKARYOTIC CELL DIFFERENTIATION DURING LONG-DURATION SPACEFLIGHTS. THE EQUIPMENT CONSISTS OF AN INCUBATOR, FOUR FLASKS OF HUMAN BLOOD, AND A VESSEL FOR LIQUID AIR.

----- SPACELAB 1, COURTES-----

INVESTIGATION NAME- VERY WIDE FIELD GALACTIC CAMERA

NSSDC ID- SPALAB1-27 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
ZODIACAL LIGHT

PERSONNEL
PI - S.C. COURTES CNRS-LAS
OI - M. VITON CNRS-LAS
OI - J.P. SIVAN CNRS-LAS
OI - M.L. ATKINS NASA-MSFC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO STUDY ZODIACAL LIGHT AND GEGENSCHN, EXTENDED GALACTIC OBJECTS, SKY BACKGROUND, CONTINUUM LIGHT AND EMISSION LINES IN HII REGIONS, EXTENSION OF GALACTIC AND EXTRAGALACTIC MATERIAL, STARS AND STAR-LIKE OBJECTS, BRIGHT UV OBJECTS, DUST CONTAMINATION AROUND SPACELAB, AND EMISSION AND MORPHOLOGY STUDIES OF ATMOSPHERIC CONSTITUENTS, WITH WIDE-FIELD (60 DEG) ULTRAVIOLET (130 TO 300 NM) AND SPECTROGRAPHIC PHOTOGRAPHY. THE EQUIPMENT IS A WIDE-FIELD CAMERA CONSISTING OF A HYPERBOLIC COLLECTOR, INTERCHANGEABLE SCHMIDT CHAMBERS (INCLUDING PRISM, FLAT MIRRORS AND FILTERS), AND A REMOVABLE PROXIMITY-FOCUSED INTENSIFIER UTILIZING A CHANNEL ELECTRON MULTIPLIER ARRAY (CEMA) DETECTOR SYSTEM WITH A 100-FRAME FILM PACKAGE.

----- SPACELAB 1, CROMMELYNCK-----

INVESTIGATION NAME- ABSOLUTE MEASUREMENT OF THE SOLAR
CONSTANT

NSSDC ID- SPALAB1-26

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D. CROMMELYNCK ROY METEOROL INST BELG
OI - V. DOMINGO ESA-ESTEC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE (1) TO USE A SELF-CALIBRATING RADIOMETER TO MEASURE THE ABSOLUTE VALUE OF THE SOLAR CONSTANT AND TO MEASURE ANY LONG-TERM VARIATIONS IN THE SOLAR CONSTANT, AND (2) TO USE SURFACES OF FUSED SILICA AND METAL EXPOSED TO PALLET CONDITIONS TO DETERMINE THE AMOUNT OF DEGRADATION OF OPTICAL SURFACES DUE TO CONDITIONS ON THE SPACELAB PALLET. THE EQUIPMENT CONSISTS OF AN ABSOLUTE RADIOMETER WITH AN INQUIRY STABILITY CHECK. THIS RADIOMETER HAS TWO CHANNELS WHICH ENABLE ANY DEGRADATION OF THE BLACK SURFACES TO BE DETECTED AND COMPENSATED. THE RADIATION MEASUREMENT WILL BE MADE BY USING A HEAT BALANCE SYSTEM DRIVEN AUTOMATICALLY BY A FEEDBACK SYSTEM.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- METRIC CAMERA FACILITY

NSSDC ID- SPALAB1-38 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE METRIC CAMERA FACILITY HAS A ZEISS RMK A 30/23 AERIAL SURVEY CAMERA AND A SKYLAB OPTICAL WINDOW, WITH THE FOLLOWING MAIN CHARACTERISTICS: F = 305 MM; F-STOPS AVAILABLE-- F/5.6, F/8, F/11; SHUTTER SPEEDS-- 1/100 AND 1/1000 S; NEGATIVE SIZE-- 23 X 23 CM (LENGTH FOR 450 PHOTOS PER MAGAZINE); ANGLE OF FIELD-- 56 DEG; AND RESOLVING POWER-- 40 PER MM. BLACK-AND-WHITE, COLOR, AND COLOR IN FILMS CAN BE USED. THE MAIN TOPICS FOR THE PROPOSED MEASUREMENTS ARE ANALYTICAL MEASUREMENTS FOR CONTROL EXTENSION, TOPOGRAPHIC MAPPING, ORTHOPHOTOMAPPING, RESOLUTION EXPERIMENT, AND THEMATIC MAPPING AND INTERPRETATION. TO GET 80 PERCENT LONGITUDINAL OVERLAP OF SUBSEQUENT PHOTOGRAPHS AT A SPACELAB VELOCITY OF 7.7 KM PER S, THERE WILL BE A TIME INTERVAL OF ABOUT 5 SECONDS BETWEEN TWO SUCCESSIVE EXPOSURES. STRIPS 1800 TO 2300 KM CAN BE COVERED ON THE GROUND IN EACH SEQUENCE.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- MICROWAVE FACILITY

NSSDC ID- SPALAB1-39 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE MICROWAVE FACILITY ARE TO DEVELOP ALL-WEATHER REMOTE SENSING METHODS, STUDY SENSOR-OBJECT INTERACTION BY MEASUREMENT OF OCEAN SURFACE WAVE SPECTRA WITH A DUAL-FREQUENCY SCATTEROMETER, AND VERIFY SYNTHETIC APERTURE RADAR BEHAVIOR. THE MICROWAVE REMOTE-SENSING EXPERIMENT (MRSE) INSTRUMENTATION IS THE RADAR FACILITY. IN THE ACTIVE MODES, THE INSTRUMENT TRANSMITS MICROWAVE ENERGY IN X-BAND (9.65 GHZ) TO EARTH TARGETS. A SENSITIVE LOW-NOISE RECEIVER DETECTS THE BACKSCATTERED RADAR SIGNALS. THE INSTRUMENT OPERATES IN THREE MODES: (1) A MAIN MODE AS A TWO-FREQUENCY SCATTEROMETER (2FS), (2) A HIGH-RESOLUTION MODE AS A SYNTHETIC APERTURE RADAR (SAR), AND (3) A PASSIVE MODE AS A PASSIVE MICROWAVE RADIOMETER. IN THE 2FS MODE, THE INSTRUMENT WILL MEASURE THE OCEAN SURFACE WAVE SPECTRA BY USING THE COMPLEX BACKSCATTERING OF THE OCEAN SURFACE AT TWO ADJACENT MICROWAVE FREQUENCIES. IN THE SAR MODE, AREAS OF THE EARTH'S SURFACE WILL BE IMAGED. THE BACKSCATTERED DATA WILL BE COHERENTLY RECORDED AND OFF-LINE PROCESSING WILL PROVIDE IMAGERY WITH A GROUND RESOLUTION OF 25 BY 25 M. THE RADIOMETER MODE MEASURES OCEAN SURFACE TEMPERATURES, AND WILL BE USED IN TIME MULTIPLEX WITH OTHER MODES.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- SPACE SLED FACILITY

NSSDC ID- SPALAB1-40 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE SPACE SLED FACILITY IS PROVIDED FOR VESTIBULAR RESEARCH ON HUMAN AND ANIMAL TEST SUBJECTS. THE SLED FACILITY CONSISTS OF A PLASTIC SEAT SHELL SUSPENDED ON A GIMBAL SYSTEM WHICH CAN BE ACCELERATED BY A MOTOR ALONG TWO GUIDING RAILS FROM ONE END OF SPACELAB TO THE OTHER. THE ACCELERATION PROFILES CAN BE PRESELECTED BETWEEN 0.001 AND 0.2 G. OSCILLATING ACCELERATION OF THE SLED WILL ALSO BE POSSIBLE (MOTION-SICKNESS STUDIES). SINCE VISUAL PERCEPTION IS NOT POSSIBLE BECAUSE THE HEAD IS ENCLOSED, AND NOISE AND VIBRATION LEVELS ARE KEPT BELOW THE THRESHOLD PERCEPTION LEVEL, THE TEST SUBJECT MAY NOT BE ABLE TO DETECT ACCELERATION CHANGES OTHER THAN THOSE OF THE BALANCE ORGANS.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- SPACE PROCESSING LABORATORY

NSSDC ID- SPALAB1-42 INVESTIGATIVE PROGRAM
CODE EM/CO-OP
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE SPACE PROCESSING LABORATORY CONSISTS OF THREE CATEGORIES: SYSTEM EQUIPMENT, MATERIAL-SCIENCES INSTRUMENTATION, AND MATERIAL-SCIENCES EXPERIMENTS. THE ISOTHERMAL HEATING FACILITY IS A MULTI-USER FACILITY FOR DIFFERENT TYPES OF EXPERIMENTS, INCLUDING SOLIDIFICATION STUDIES, DIFFUSION FUNDAMENTALS, CASTING OF METALS AND COMPOSITES, AND PREPARATION OF NEW AND/OR IMPROVED GLASSES AND CERAMICS. THE GRADIENT HEATING FACILITY FOR LOW TEMPERATURES IS DEFINED TO BE A MULTIPURPOSE FACILITY FOR DIFFERENT TYPES OF EXPERIMENTS SUCH AS CRYSTAL GROWTH AND UNIDIRECTIONAL SOLIDIFICATION OF EUTECTICS. VACUUM AND NOBLE GAS SUPPLY PROVISIONS ARE PART OF THE FACILITY. THE MINOR HEATING FACILITY IS AN EXPERIMENTAL FACILITY WHICH IS PARTICULARLY SUITABLE FOR INVESTIGATING CRYSTAL GROWTH USING THE MELT ZONE OR TRAVELING SOLVENT METHODS. THE FLUID PHYSICS MODULE CONSISTS MAINLY OF A STRUCTURE FITTED WITH TWO DISCS WHICH CAN BE ROTATED SEPARATELY, AT THE SAME OR DIFFERENT SPEEDS, AND IN EITHER DIRECTION.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN

NSSDC ID- SPALAB1-31 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - O.H. GAUER U OF BERLIN
OI - R. KOCH U OF BERLIN
OI - F. ROCKER U OF BERLIN
OI - KIRSCH U OF BERLIN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PROCURE ABSOLUTE DATA, BY RECORDING CENTRAL VENOUS PRESSURE (MEASURED BY PUNCTURING AN ARM VEIN), THAT THE ADAPTION OF MINERAL AND WATER METABOLISM TO THE WEIGHTLESS CONDITION IS INITIATED BY THE ENGORGEMENT OF THE CEPHALAD CIRCULATION. THE EQUIPMENT CONTAINS SIX STRAIN-GAGE MANOMETERS, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES

NSSDC ID- SPALAB1-37 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - O.H. GAUER U OF BERLIN
OI - KIRSCH U OF BERLIN
OI - R. KOCH U OF BERLIN
OI - F. ROCKER U OF BERLIN
OI - M. STOBOV U OF BERLIN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS THE CONFIRMATION AND COMPLETION OF SIMILAR WORK IN THE SKYLAB FLIGHTS, AND ATTEMPT TO FIND A CONNECTION WITH CIRCULATORY PARAMETERS. THE EQUIPMENT IS A CENTRIFUGE AND A STORAGE CONTAINER AT MINUS 20 DEG C.

----- SPACELAB 1, GAUSE-----

INVESTIGATION NAME- TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL

NSSDC ID- SPALAB1-10 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R.L. GAUSE NASA-MSFC
OI - A.F. WHITAKER NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO DETERMINE THE EFFECT OF ZERO GRAVITY ON THE OPERATION OF FLUID-LUBRICATED JOURNAL BEARINGS, (2) TO OBSERVE FLUID FLOW-SURFACE WETTING AND HYDRODYNAMIC FLUID FORMATION IN JOURNAL BEARINGS OPERATING IN ZERO GRAVITY, (3) TO OBSERVE AND MEASURE DYNAMIC INSTABILITIES IN HYDRODYNAMIC BEARINGS IN ZERO GRAVITY, (4) TO EVALUATE THE USE OF MAGNETIC FIELDS AND FERROLUBRICANTS FOR PREVENTING DYNAMIC INSTABILITY IN JOURNAL BEARINGS OPERATING IN ZERO GRAVITY, AND (5) TO EVALUATE THE USE OF MAGNETIC FIELDS FOR CONTROLLING FERROFLUIDS IN ZERO GRAVITY. EQUIPMENT CONSISTS OF TYPICAL JOURNAL BEARING AND LUBRICANT, FERROFLUID LUBRICATED MAGNETIC JOURNAL, TRANSPARENT BEARINGS TO FACILITATE PHOTOGRAPHY AND OBSERVATION, AND A CAMERA.

----- SPACELAB 1, GREEN-----

INVESTIGATION NAME- ELECTRO-PHYSIOLOGICAL TAPE RECORDER

NSSDC ID- SPALAB1-35 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - M.L. GREEN CLINICAL RES CENTER
OI - F.D. STOTT CLINICAL RES CENTER
OI - M.S. WOIFF CLINICAL RES CENTER

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY ACCLIMATIZATION OF ASTRONAUTS TO ZERO GRAVITY BY MEANS OF AN ELECTROCARDIOGRAPH (ECG), ELECTROENCEPHALOGRAPH (EEG), AND ELECTRO-OCULOGRAPH (EOG) ON A CONTINUOUS BASIS BY A MINIATURE TAPE RECORDER ATTACHED TO THE CREW MEMBER. THE EQUIPMENT CONSISTS OF ECG, EEG, AND EOG ELECTRODES, PREAMPLIFIER, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, HART-----

INVESTIGATION NAME- GEOPHYSICAL FLUID FLOW

NSSDC ID- SPALAB1-08 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL
PI - J.E. HART U OF COLORADO
OI - J. TOOMRE U OF COLORADO
OI - P.A. GILMAN HIGH ALTITUDE OBS
OI - G.M. FICHTL NASA-MSFC

BRIEF DESCRIPTION

THERE ARE TWO EXPERIMENT OBJECTIVES. ONE OBJECTIVE OF THIS EXPERIMENT IS TO UNDERSTAND THE CONVECTION OF STARS AND THE SUN BY STUDYING (1) THE ONSET OF CONVECTION BETWEEN CONCENTRIC SPHERES AS A FUNCTION OF IMPOSED TEMPERATURE DIFFERENCES AND ROTATION, (2) THE SHAPES OF THE CONVECTION CELLS AT THE ONSET OF CONVECTION AND ITS EVOLUTION, AND (3) THE INTERACTIVE MOTIONS SUCH AS MEAN AZIMUTHAL FLOWS OBSERVED ON THE SOLAR EQUATORIAL REGION. THE OTHER OBJECTIVE IS TO ACT AS THE FORERUNNER OF A SERIES OF PROPOSED EXPERIMENTS TO STUDY THE BAROCLINIC PROPERTIES OF THE EARTH'S ATMOSPHERE AND THE GENERAL CIRCULATION OF THE EARTH'S OCEAN BASINS. THE EQUIPMENT CONSISTS OF AN ELECTROCONVECTION CELL, CONTROLLERS, AND A CAMERA.

----- SPACELAB 1, HERSE-----

INVESTIGATION NAME- WAVES IN THE OH EMISSIVE LAYER

NSSDC ID- SPALAB1-19 INVESTIGATIVE PROGRAM
CODE EB/CO-OP
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M. HERSE
OI - G. MOREELS
CNRS-SA
CNRS-SA

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO STUDY THE LARGE-SCALE STRUCTURE OF THE ATMOSPHERIC EMISSION, AND TO INVESTIGATE POSSIBLE RELATIONS BETWEEN THE EMISSION STRUCTURE AND OROGRAPHY OR METEOROLOGICAL PHENOMENA. THE EQUIPMENT CONTAINS AN IMAGE INTENSIFIER WITH A CAMERA, FILTER, AND 16-MM MOVIE CAMERA WITH A 25-MM F/8.95 LENS. THE SPECTRAL PART OF THE AIRGLOW IS DELIMITED ON THE SHORT WAVELENGTH SIDE BY A WRITTEN BDA FILTER (80 PERCENT CUTOFF AT 75 NANOMETERS) AND ON THE IR SIDE BY THE SENSITIVITY OF THE PHOTOCATHODE (50 PERCENT CUTOFF AT 850 NANOMETERS).

----- SPACELAB 1, HONECK-----

INVESTIGATION NAME- MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT

NSSDC ID- SPALAB1-34 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - S. HONECK U OF FRANKFURT
OI - C. THOMAS-GORFIAS U OF FRANKFURT
OI - G. REITZ U OF FRANKFURT

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO MEASURE QUANTITATIVELY THE EFFECTS OF SPACE PARAMETERS (VACUUM, SOLAR UV-RADIATION) ON MICROBIAL BACTERIAL SPORES, BACTERIAL VEGETATIVE CELLS, BACTERIOPHAGES AND ENZYMES, AND TO UNDERSTAND THE EFFECTS ON THESE SAMPLES; (2) TO EVALUATE THE CONSEQUENCES OF GENETIC AND RESPONSE ALTERATIONS; AND (3) TO COMPARE THE RESULTS WITH SIMULATION EXPERIMENTS PERFORMED IN THE LABORATORY. THE EQUIPMENT IS A BOX ACCOMMODATING 100 TO 200 BIOLOGICAL SAMPLES.

----- SPACELAB 1, KINZEY-----

INVESTIGATION NAME- INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN

NSSDC ID- SPALAB1-14 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - S.L. KINZEY NASA-JSC
OI - W.H. CROSBY SCRIPPS C+R FOUNDATION
OI - M. TAVASSOLI SCRIPPS C+R FOUNDATION
OI - P.C. JOHNSON BAYLOR U
OI - J.P. CHEN U OF TENNESSEE
OI - C.D.R. DUNN U OF TENNESSEE
OI - R.D. LANGE U OF TENNESSEE
OI - E.C. LARKIN VETERANS ADMIN HOSP

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO OBTAIN NEW AND SPECIFIC INFORMATION PERTAINING TO THE MECHANISM AND SITE OF ACTION RELATIVE TO THE RED BLOOD CELL MASS AND PLASMA VOLUME CHANGES OBSERVED DURING SPACE FLIGHT. THE EQUIPMENT CONSISTS OF AN IN-FLIGHT BLOOD COLLECTION SYSTEM AND A REFRIGERATOR.

----- SPACELAB 1, MENDE-----

INVESTIGATION NAME- ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING

NSSDC ID- SPALAB1-03 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - S.D. MENDE LOCKHEED PALO ALTO
OI - R.H. EATHER BOSTON COLLEGE
OI - R.J. NAUMANN NASA-MSFC
OI - D.L. REASONER NASA-MSFC
OI - G.R. SWENSON NASA-MSFC
OI - D.J. DUNCAN NASA-MSFC
OI - K.S. CLIFTON NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO INVESTIGATE THE UPPER-ATMOSPHERIC TRANSPORT PROCESSES THROUGH THE MEASUREMENT OF RESONANT SCATTERED EMISSIONS FROM POSITIVE MG IONS, (2) TO MEASURE EXCITATION CROSS SECTIONS OF UPPER ATMOSPHERIC CONSTITUENTS USING INJECTED PARTICLE BEAMS AND DETECTION OF THE RESULTING EMISSIONS, (3) TO INVESTIGATE ATMOSPHERIC COMPOSITION AND ENERGY BUDGET THROUGH OBSERVATIONS OF NATURAL AURORA, (4) TO OBSERVE LARGE- AND SMALL-SCALE AURORAL MORPHOLOGY AND COMPARE ULTRAVIOLET AND VISIBLE AURORAL FEATURES, (5) TO SUPPORT THE ELECTRON ACCELERATOR IN CONDUCTING MEASUREMENTS OF MAGNETOSPHERIC ELECTRIC FIELDS, AND (6) TO MEASURE SMALL PARTICULATE CONTAMINATION AROUND THE SHUTTLE/ SPACELAB. THE EQUIPMENT CONSISTS OF (1) A DUAL-CHANNEL VIDEO SYSTEM WITH

ASSOCIATED OPTICS AND DATA HANDLING ELECTRONICS MOUNTED ON A STABILIZED PLATFORM FOR POINTING AND CONTROL, (2) SEC VIDICON FOR HIGH-SENSITIVITY, HIGH-RESOLUTION OPERATION, (3) A LOW-RESOLUTION MICROCHANNEL PLATE ARRAY OPERATING IN A PHOTON COUNTING MODE, AND (4) COMS AND ONBOARD RECORDERS UTILIZED FOR DATA DISPLAY AND RECORDING. THE MAGNESIUM POSITIVE ION RESONANCE LINE WILL BE IMAGED AT 279.5 AND 280.2 NANOMETERS. FOR THE ATOMIC OXYGEN POSITIVE ION 2-P STATE STUDY, SIMULTANEOUS SENSING AT 731.9 AND 247.8 NANOMETERS WILL BE OBTAINED.

----- SPACELAB 1, ODAYASHI-----

INVESTIGATION NAME- SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)

NSSDC ID- SPALAB1-P2 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - I. ODAYASHI U OF TOKYO
OI - J.M. SELLEN, JR. TRU SYSTEMS GROUP
OI - J.L. BURCH SOUTHWEST RES INST
OI - C.R. CHAPPELL NASA-MSFC
OI - M.Y. ROBERTS NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE AN ELECTRON BEAM ACCELERATOR AND A MAGNETO-PLASMA DYNAMIC (MPD) ARCJET TO STUDY: (1) AURORAL PRODUCTION IN THE UPPER ATMOSPHERE, (2) IONOSPHERIC PARAMETERS SUCH AS ANOMALOUS RESISTIVITY, PLASMA COUPLING PROCESS, ELECTRIC AND MAGNETIC FIELD MORPHOLOGY, VEHICLE CHARGE NEUTRALIZATION, SHUTTLE/SPACELAB INDUCED ENVIRONMENTS, ELECTRON BEAM/ NEUTRAL PLUME INTERACTION, THE COUPLING BETWEEN THE EARTH'S ATMOSPHERE AND MAGNETOSPHERE, AND (3) THE EFFECTS OF PARTICLE INTERACTIONS ON ATMOSPHERIC DYNAMICS. THE EQUIPMENT CONSISTS OF AN ELECTRON BEAM ACCELERATOR, MAGNETO-PLASMA DYNAMIC ARCJET, BATTERY/CAPACITOR BANK TO PROVIDE HIGH DISCHARGE CURRENT, MONITOR AND DIAGNOSTIC DEVICES, AND CONTROL, DISPLAY, AND DATA MANAGEMENT SYSTEMS. THE ELECTRON BEAM ACCELERATOR, MPD ARCJET, AND NEUTRAL GAS EJECTOR ARE CONTAINED IN THE ACCELERATOR SUBSYSTEM. THE ELECTRON BEAM ACCELERATOR IS CAPABLE OF OPERATING AT VOLTAGES FROM 1 TO 7.5 KILOVOLTS AT A MAXIMUM OF 1.5 AMPS AND WITH A VARIABLE PULSE WIDTH OF FROM 10 MILLISECONDS TO 1 S. THE MPD ARCJET USES ARGON GAS AND HAS AN ENERGY INPUT OF 2 KILOJOULES PER PULSE. THE THIRD ACCELERATOR COMPONENT IS A NEUTRAL GAS PLUME GENERATOR WHICH USES NITROGEN AS THE GAS.

----- SPACELAB 1, PAN-----

INVESTIGATION NAME- BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G

NSSDC ID- SPALAB1-09 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - C.H.T. PAN SHAKER RESEARCH CORP

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE AS FOLLOWS: (1) TO DETERMINE THE EXTENT TO WHICH SELECTED COMMERCIAL LUBRICANT WETTABILITY IS AFFECTED BY A ZERO-GRAVITY ENVIRONMENT, (2) TO DETERMINE HOW BEARING TORQUE, BEARING LUBRICANT FEEDING, AND BEARING OPERATING FILMS ARE ALTERED BY OPERATIONS IN ZERO GRAVITY, (3) TO COMPARE RESULTS WITH LABORATORY RESEARCH OF COMMERCIAL APPLICATIONS, AND (4) TO PROVIDE DATA FOR APPLICATIONS IN SPACE HARDWARE. THE EQUIPMENT CONSISTS OF PLATES FOR LUBRICANT WETTING AND SPREADING TESTS, HYDRODYNAMIC JOURNAL BEARING, AND AN AVAILABLE FLIGHT CAMERA. TWO TYPES OF EXPERIMENTS WILL BE CONDUCTED: WETTING AND SPREADING ON STATIONARY SURFACES, AND TWO-PHASE BOUNDARY IN A JOURNAL-BEARING CONFIGURATION. IN EACH CASE, THE FLUID-SURFACE COMBINATION WILL BE THE PRIMARY CONTROL PARAMETER.

----- SPACELAB 1, RESCHKE-----

INVESTIGATION NAME- VESTIBULO-SPINAL REFLEX MECHANISMS

NSSDC ID- SPALAB1-16 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - M.F. RESCHKE NASA-JSC
OI - J.L. MORICK NASA-JSC
OI - D.J. ANDERSON U OF MICHIGAN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE THE ESA SLED TO DETERMINE IF THE VESTIBULO-SPINAL REFLEX MEASUREMENT TECHNIQUE (N-REFLEX) IS SUITABLE AS AN EFFECTIVE PREDICTOR OF SUSCEPTIBILITY TO SPACE MOTION SICKNESS, AND TO STUDY THE RELATIONSHIP BETWEEN MOTION SICKNESS SENSITIVITY ON THE EARTH WITH CHANGES IN POSTURAL REFLEXES OBSERVED IN FLIGHT. THE EQUIPMENT CONSISTS OF A SLED FACILITY, POWER MODULE CONTAINING PULSE GENERATOR-OSCILLOSCOPE DIFFERENTIAL AMPLIFIER AND MICROPROCESSOR, PREAMPLIFIER, STIMULUS ISOLATION UNIT, AND ELECTRODE KIT.

SPACELAB 1, ROSS

INVESTIGATION NAME- MASS DISCRIMINATION DURING WEIGHTLESSNESS

NSSDC ID- SPALAB1-38 INVESTIGATIVE PROGRAM CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H. ROSS U OF STIRLING

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO COMPARE MASS DISCRIMINATION WHEN BOTH THE OBSERVER AND THE TEST OBJECTS ARE WEIGHTLESS, WITH WEIGHT DISCRIMINATION UNDER NORMAL GRAVITY. THE EQUIPMENT IS A BOX CONTAINING WEIGHTED CONTAINERS, A BLINDFOLD, INSTRUCTIONS, AND RECORD CARDS.

SPACELAB 1, SCAND

INVESTIGATION NAME- BALLISTOCARDIOGRAPHIC RESEARCH IN WEIGHTLESSNESS

NSSDC ID- SPALAB1-33 INVESTIGATIVE PROGRAM CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - A. SCAND U OF ROME

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO RECORD A THREE-DIMENSIONAL BALLISTOCARDIOGRAM (BCG) IN A RESTING WEIGHTLESS HUMAN SUBJECT AND COMPARE IT WITH SIMILAR TRACINGS RECORDED ON THE SAME SUBJECT IN GROUND CONDITIONS, POSSIBLY TO FIND BCG MODIFICATIONS IN RELATION TO CARDIOVASCULAR ADAPTATION TO WEIGHTLESSNESS, AND TO RECORD OTHER BODY ACCELERATIONS IN RELATION TO DIAPHRAGM DYNAMICS DURING SPONTANEOUS BREATHING, HYPERVENTILATION, AND COUGH. THE EQUIPMENT CONSISTS OF THREE SERVO-ACCELEROMETERS AND ONE ELECTROCARDIOGRAPH RECORDER WITH FOUR CHANNELS.

SPACELAB 1, SULZMAN

INVESTIGATION NAME- CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS

NSSDC ID- SPALAB1-15 INVESTIGATIVE PROGRAM CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - F.M. SULZMAN HARVARD U
OI - M.C. MOORE HARVARD U

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE (1) TO TEST IF CIRCADIAN RHYTHMS PERSIST OUTSIDE THE EARTH'S ENVIRONMENT, AND TO DETERMINE IF THE CIRCADIAN TIMING SYSTEM IS EXOGENOUS OR ENDOGENOUS, AND (2) TO EXAMINE THE INFLUENCE OF THE SPACE ENVIRONMENT ON THE CIRCADIAN ORGANIZATION. THE EQUIPMENT CONSISTS OF A LIGHT-LIGHT BOX CONTAINING 24 GROWTH TUBES.

SPACELAB 1, THEILE

INVESTIGATION NAME- DC AND LOW FREQUENCY VECTOR MAGNETOMETER

NSSDC ID- SPALAB1-23 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - B. THEILE DRAUSCHWEIG TECH U

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE A THREE-AXIS FLUXGATE MAGNETOMETER TO STUDY (1) MAGNETIC FIELDS OF THE IONOSPHERIC POLAR ELECTROJET AND ITS RETURN CURRENT, EQUATORIAL ELECTROJET, AND THE SOLAR QUIET CURRENT, (2) THE VECTOR MAGNETIC FIELD AS A PLASMA PARAMETER, AND (3) THE SPACELAB MAGNETIC FIELD BACKGROUND. THE EQUIPMENT CONSISTS OF TWO SEPARATE THREE-AXIS FLUXGATE SENSORS.

SPACELAB 1, THUILLIER

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE

NSSDC ID- SPALAB1-20 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
OI - J.E. DIAMONT CNRS-SA
OI - M.L. DUBOIN CNET
OI - P. CONNES PARIS OBSERVATORY

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE (1) TO USE A NICHOLSON INTERFEROMETER TO DETERMINE THE TEMPERATURE AND WIND PROFILES FROM THE TOP OF THE MESOSPHERE TO THE THERMOSPHERE BY ANALYSIS OF THE LINE WIDTHS AND DOPPLER SHIFTS OF NATURAL EMISSION OF DAYGLOW AND NIGHTGLOW CONSTITUENTS, AND (2) TO USE THIS EXPERIMENT AS A DEMONSTRATION FOR MORE SOPHISTICATED INSTRUMENTS TO BE FLOWN ON FUTURE MISSIONS. THE EQUIPMENT CONSISTS OF THREE FIELD-COMPENSATED NICHOLSON INTERFEROMETERS, A HIGH-RESOLUTION INSTRUMENT, AND A CASSEGRAIN TELESCOPE. THE 630.8- AND 557.7-NANOMETER OI LINES AND THE 731.9-NANOMETER OII LINE OF THE AIRGLOW SPECTRUM ARE OBSERVED FOR THERMOSPHERIC MEASUREMENTS. FOR MESOSPHERIC MEASUREMENTS, THE 557.7-NANOMETER LINE AND THE 730.8-NANOMETER LINES IN THE (B-3) BAND OF THE OH POSITIVE ION RADICAL ARE UTILIZED.

SPACELAB 1, THUILLIER

INVESTIGATION NAME- MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS

NSSDC ID- SPALAB1-21 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
PI - P. SIMON IASB
OI - J.E. DIAMONT CNRS-SA
OI - R. PASTIELS IASB
OI - D. LABS LANDESTERNHARTE

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO MEASURE THE SOLAR SPECTRAL IRRADIANCE BETWEEN 170 AND 3200 NANOMETERS WITH AN ACCURACY OF 0.1 PERCENT IN ORDER TO DETERMINE THE SOLAR CONSTANT, VARIATIONS IN THE SOLAR CONSTANT WITH SOLAR CYCLE USING SPACELAB/STS FLIGHTS OVER A 10-YEAR PERIOD, AND VARIATIONS OF IRRADIANCE WITHIN EACH SPECTRAL REGION. THE EQUIPMENT CONSISTS OF THREE GRATING SPECTROMETERS COVERING UV-- 170.0 TO 370.0 NM (1-NM BANDPASS), VISIBLE-- 350.0 TO 900 NM (1-NM BANDPASS), AND IR-- 800 TO 3200 NM (10-NM BANDPASS).

SPACELAB 1, TORR

INVESTIGATION NAME- AN IMAGING SPECTROMETRIC OBSERVATORY

NSSDC ID- SPALAB1-01 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M.R. TORR U OF UTAH
OI - A.L. BROADFOOT U OF SOUTHERN CALIF
OI - D.E. SHERANSKY U OF SOUTHERN CALIF
OI - B.R. SANDEL U OF SOUTHERN CALIF
OI - S.K. ATREYA U OF MICHIGAN
OI - G.R. CARLIGNAN U OF MICHIGAN
OI - J.C.G. WALKER U OF MICHIGAN
OI - D.G. TORR U OF UTAH
OI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE (1) TO OBTAIN THE FIRST DAYTIME MEASUREMENTS OF THE AIRGLOW SPECTRUM FROM THE EXTREME ULTRAVIOLET TO THE INFRARED (20 TO 1200 NM), (2) TO MONITOR THE SHUTTLE-INDUCED CONTAMINATION, AND (3) TO SERVE AS A PRECURSOR FOR FUTURE SHUTTLE FLIGHTS. IT IS PLANNED TO MEASURE EMISSIONS FROM A LARGE RANGE OF MINOR CONSTITUENTS, METASTABLE AND EXCITED SPECIES OF BOTH ATOMIC AND MOLECULAR IONS AND NEUTRALS IN THE ATMOSPHERE FROM THE STRATOSPHERE TO THE UPPER THERMOSPHERE. THE FLIGHT INSTRUMENT IS DESIGNED FOR HIGH-SPEED OPERATION AS AN IMAGING DEVICE, AND IS COMPOSED OF FIVE IDENTICAL SPECTROMETERS, EACH OF WHICH IS RESTRICTED TO A GIVEN SPECTRAL RANGE WITHIN THE 20 TO 1200 NM REGION. EACH MODULE IS AN IMAGING SCANNING SPECTROMETER WITH COINCIDENT 0.5 N 0.007-DEG FIELDS OF VIEW. IMAGING CAPABILITY IS OBTAINED ALONG THE LENGTH OF THE OBSERVATIONAL FIELD BY USE OF AN AREA ARRAY DETECTOR COMPRISING 190 X 244 ELEMENTS. THUS, A SINGLE MEASUREMENT PRODUCES ADJACENT SPECTRA IN A GIVEN MODULE

OBTAINED FROM ADJACENT OBSERVATIONAL FIELDS. WAVELENGTH RESOLUTION VARIES BETWEEN 0.2 AND 0.6 NM OVER THE SPECTRAL RANGE. A SCAN MIRROR IS USED, AND A SINGLE EXPOSURE AT ONE SCAN POSITION COVERS A 250-NM REGION. THE TELESCOPE WILL BE DAPPLED, AND IT WILL HAVE SEVERAL OPERATING MODES.

----- SPACELAB 1, VON BAUMGARTEN-----

INVESTIGATION NAME- HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS)

NSSDC ID- SPALAB1-01 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - R. VON BAUMGARTEN U OF MAINE
OI - J. DICHGANS U OF FREIBURG
OI - T. BRANDT KRUPP KRAEMER-ANGSTADT
OI - M. SCHNERER U OF MUNICH

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO USE THE SLED TO STUDY THE VISUO-VESTIBULAR COORDINATION AND THE INTEGRATION OF MULTISENSORY STIMULI WITHIN THE ORIENTATION CENTERS OF THE BRAIN BY EXPOSING THE SUBJECT TO SHORT PERIODS OF LINEAR ACCELERATION IN CONJUNCTION WITH OPTOKINETIC STIMULATION AND CALORIC STIMULATION. IN ADDITION TO THE SPACE SLED, THE EQUIPMENT CONTAINS AN OPTOKINETIC STIMULATION DISPLAY, A CALORIC STIMULATION SYSTEM, AN OPTICAL TARGET SETTING SYSTEM, AN EYE-MOVEMENT RECORDER, AN ELECTROMYOGRAPHIC RECORDING SYSTEM, AN ELECTROSTAGNOGRAPHIC RECORDING SYSTEM, AN ELECTROCARDIOGRAPHIC RECORDING SYSTEM, AND A MOTION-PERCEPTION INDICATOR.

----- SPACELAB 1, VOSS, JR.-----

INVESTIGATION NAME- EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS

NSSDC ID- SPALAB1-17 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - E.W. VOSS, JR. U OF ILLINOIS

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE AN EVALUATION OF PROLONGED WEIGHTLESSNESS AS A STRESS FACTOR ON THE HUMORAL IMMUNE RESPONSE OF HUMANS, AND TO ESTABLISH THE CAPABILITY OF HUMANS TO RESPOND IMMUNOLOGICALLY TO POTENTIAL FOREIGN PATHOGENS DURING FUTURE SUSTAINED SPACE FLIGHT. THE EQUIPMENT INCLUDES A CONTAINER FOR STORING BLOOD SAMPLES, STERILE SYRINGES, NEEDLES, AND TEST TUBES.

----- SPACELAB 1, WILHELM-----

INVESTIGATION NAME- STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION

NSSDC ID- SPALAB1-24 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. WILHELM MPI-AERONOMY
OI - W. STUEDEMANN MPI-AERONOMY
OI - W. RIEDLER TECH U OF GRAZ

BRIEF DESCRIPTION
A 2-PI FIELD OF VIEW ELECTROSTATIC ANALYZER MEASURES NATURAL ELECTRON FLUXES IN THE 0.1 TO 12.0-KEV RANGE IN ORDER TO STUDY (1) THE PRECIPITATION PROCESS IN AURORAL EMISSION, (2) THE EFFECTS OF THE ELECTRON ACCELERATOR (SEPAC) OPERATIONS ON THE NATURAL ELECTRON FLUXES, (3) THE INFLUENCE OF THE SHUTTLE/SPACELAB GENERATED ATMOSPHERE ON THE NATURAL ELECTRON FLUX, AND (4) THE NATURAL ELECTRON FLUX AS A SENSITIVE PROBE OF THE SURFACE CHARGE ON THE STS/SPACELAB. THE EQUIPMENT CONSISTS OF AN ELECTROSTATIC DEFLECTION DEVICE WITH A HEMISPHERIC FIELD OF VIEW AND WITH AZIMUTH AND PITCH-ANGLE RESOLUTION, AND EIGHT CONTINUOUS-CHANNEL ELECTRON MULTIPLIERS FOR DETECTORS.

----- SPACELAB 1, WILLSON-----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR

NSSDC ID- SPALAB1-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. WILLSON NASA-JPL
OI - R. MEER NASA-JPL
OI - H. ZIRIN CALIF INST OF TECH
OI - J. KENDALL, SR. CALIF INST OF TECH

BRIEF DESCRIPTION
THE OBJECTIVE OF THE ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR EXPERIMENT IS TO MEASURE THE TOTAL SOLAR IRRADIANCE WITH MAXIMUM ACCURACY AND PRECISION. THE SOLAR IRRADIANCE FROM FAR ULTRAVIOLET THROUGH FAR INFRARED WAVELENGTHS WILL BE MEASURED BY THREE TYPE-IV ACTIVE-CAVITY RADIOMETER DETECTORS. THESE DETECTORS ARE ELECTRICALLY SELF-CALIBRATED, CAVITY PYROMETERES EACH CAPABLE OF DEFINING THE ABSOLUTE RADIATION SCALE WITH AN UNCERTAINTY OF PLUS OR MINUS 0.1 PERCENT IN THE INTERNATIONAL SYSTEM OF UNITS (SI) AT THE SOLAR 'CONSTANT' LEVEL. THE THREE DETECTORS WILL BE INDEPENDENTLY SHUTTERED, AND THEIR CYCLES OF OPERATION WILL BE DIFFERENT. CHANNEL A WILL BE USED ROUTINELY TO MONITOR THE TOTAL SOLAR IRRADIANCE. THE TIME CONSTANT FOR A REFERENCE OR OBSERVATION PHASE STEP FUNCTION OF SOLAR 'CONSTANT' MAGNITUDE WILL BE LESS THAN 2 S. THE SECOND DETECTOR (CHANNEL B) WILL BE INTERMITTENTLY COMPARED WITH CHANNEL A TO ESTABLISH A'S LONG-TERM STABILITY OR TO CALIBRATE ANY APPARENT DEGRADATION. CHANNEL C, AFTER INITIAL COMPARISON WITH A AND B, WILL BE USED ONLY TO RESOLVE AMBIGUITIES ARISING FROM OPERATION OF THE FIRST TWO.

----- SPACELAB 1, YOUNG-----

INVESTIGATION NAME- VESTIBULAR STUDIES

NSSDC ID- SPALAB1-13 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - L.R. YOUNG MASS INST OF TECH
OI - G.M. JONES McGill U
OI - R.E. MALCOLM D+C INST OF ENVIRON MED
OI - K.E. MOREY D+C INST OF ENVIRON MED
OI - C.W. OWAN MASS INST OF TECH

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO DETERMINE IF OTOLITH SENSITIVITY CHANGES ARE INVOLVED IN SPACE MOTION SICKNESS AND POSTFLIGHT POSTURAL DISTURBANCES. EQUIPMENT CONSISTS OF SLED FACILITY, MOTOR-DRIVEN ROTATING FIELD, 16-MM MOVIE CAMERA, CALIBRATION LIGHT ARRAY, STATION FOR HOPPING TEST, AND TAPE RECORDER.

***** SPACELAB 2*****

SPACECRAFT COMMON NAME- SPACELAB 2
ALTERNATE NAMES-

NSSDC ID- SPALAB2

LAUNCH DATE- 10/31/83 WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSG

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.5 MIN
PERIAPSIS- 400. KM ALT INCLINATION- 50. DEG
APOAPSIS- 400. KM ALT

PERSONNEL
PM - R.E. PACE NASA-MSFC
MS - E.W. URRAN NASA-MSFC
MG - R.A. KENNEDY NASA HEADQUARTERS
SC - E. WEILER NASA HEADQUARTERS
PW - D.C. JEAN NASA-MSFC

BRIEF DESCRIPTION
SPACELAB 2 CONSISTS OF THREE PALLETS AND A UNIQUE STRUCTURE (CALLED THE ISLOO) ON WHICH VARIOUS INSTRUMENTS ARE EXPOSED TO THE SPACE ENVIRONMENT. INCLUDED IN THE PAYLOAD IS THE INSTRUMENT-POINTING SYSTEM BUILT BY THE EUROPEAN SPACE AGENCY (ESA) AND DESIGNED TO POINT THE INSTRUMENTS AT TARGETS OF OPPORTUNITY. THE FOLLOWING INVESTIGATIONS HAVE BEEN CHOSEN TO FLY ON THIS MISSION: VITAMIN D METABOLITES AND BONE DEMINERALIZATION, INTERACTION OF ORGYENIC AND GRAVITY-INFLUENCED LIGNIFICATION, EJECTABLE PLASMA DIAGNOSTICS PACKAGE, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO-ASTRONOMICAL STUDIES, SMALL HELIUM-COOLED INFRARED TELESCOPE, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI BETWEEN 50 GEV PER NUCLEON AND SEVERAL TEV PER NUCLEON, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES, SOLAR MAGNETIC- AND VELOCITY FIELD MEASUREMENT SYSTEM, CORONAL HELIUM ABUNDANCE SPACELAB EXPERIMENT, HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH, SOLAR UV SPECTRAL IRRADIANCE MONITOR, IN-ORBIT CALIBRATION OF NASA LOW-GRAVITY ACCELEROMETER, AND PROPERTIES OF SUPERFLUID HELIUM IN ZERO GRAVITY.

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS)

NSDDC ID- SPALAB2-10

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER	US NAVAL RESEARCH LAB
O1 - J.D.F. BARTOE	US NAVAL RESEARCH LAB
O1 - G.K. ROE	US NAVAL RESEARCH LAB
O1 - K.N. NICOLAS	US NAVAL RESEARCH LAB
O1 - R.E. VAN HOOSIER	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION FOLLOW: (1) THE STUDY OF THE ENERGY TRANSPORT AND MASS BALANCE OF THE TEMPERATURE MINIMUM, CHROMOSPHERE, TRANSITION ZONE, AND CORONA IN THE QUIET SUN AS WELL AS IN PLAGES, FLARES, AND SUNSPOTS; (2) THE EXAMINATION OF THE VELOCITY FIELD OF THE LOWER CORONA TO STUDY THE ORIGIN OF THE SOLAR WIND; (3) THE STUDY OF THE STRUCTURE AND DYNAMICS OF SPICULES AND SUPERSPICULES IN THE UV SPECTRUM; (4) THE STUDY OF STRUCTURE AND DYNAMICS OF PROMINENCES; AND (5) THE STUDY OF PRE-FLARE AND FLARE PHENOMENA. THESE OBJECTIVES ARE OBTAINED THROUGH INTENSITY MEASUREMENTS, DOPPLER MEASUREMENTS, AND LINE-PROFILE ANALYSIS OF HIGH SPATIAL RESOLUTION (1 ARC S) AND HIGH SPECTRAL RESOLUTION (5 PICOMETERS) OF UV SPECTRA (WAVELENGTHS 117.6-170 NANOMETERS) COVERING A WIDE VARIETY OF CONTINUUM AND EMISSION LINES THAT ORIGINATE IN DIFFERENT TEMPERATURE REGIMES OF THE SOLAR ATMOSPHERE. THE INSTRUMENTATION CONSISTS OF A STYGMATIC SPECTROGRAPH WITH A SLIT THAT COVERS THE FULL SOLAR RADIUS 5; MULTANEOUSLY WITH 1000 RESOLUTION ELEMENTS. THUS THE SLIT COVERS MANY DIFFERENT SOLAR FEATURES AT THE SAME TIME. ONE SPECTRUM CONTAINS ENOUGH INFORMATION FOR A STATISTICAL ANALYSIS. PHOTOGRAPHS OF A SERIES OF SPECTRA OVER A PERIOD OF AT LEAST 1 MIN ARE MADE IN ORDER TO FOLLOW THE CHANGES IN THE INTENSITY, DOPPLER VELOCITIES, AND LINE PROFILES AS THEY ARE CAUSED BY DISTURBANCES MOVING THROUGH THE SOLAR ATMOSPHERE. SPECTROHELIOGRAMS OF THE DIMENSIONS AS A FUNCTION OF TIME ARE CONSTRUCTED IN ORDER TO INVESTIGATE THE 3-DIMENSIONAL STRUCTURE OF THE CHROMOSPHERE AND TRANSITION ZONE. A SYSTEMATIC MAPPING OF THE CORONAL VELOCITY FIELD OVER THE WHOLE SUN IS ALSO MADE, ALONG WITH A SERIES OF LIMP SPECTRA AT DIFFERENT ALTITUDES FOR STUDIES OF THE STRUCTURE AND DYNAMICS OF SPICULES. THE SLIT IS POINTED WITHIN A TOLERANCE OF HALF A SLIT WIDTH FOR A DURATION OF AT LEAST 15 MIN. THE SLIT OF THE HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) IS STEPPED IN RATIO SEQUENCE OVER A SMALL AREA OF THE SUN (PLUS OR MINUS 5 ARC S), WHICH ALLOWS THE SPECTROHELIOGRAMS TO BE MADE. THE HRTS CONSISTS OF A 30-CM GREGORIAN TELESCOPE OF 90-CM FOCAL LENGTH, A UV SPECTROGRAPH, A 160 NANOMETER BROAD-BAND SPECTROHELIOGRAPH, AND AN H-ALPHA SPLIT-DISPLAY SYSTEM HOUSED IN A THERMAL CONTROL CANISTER MOUNTED ON THE INSTRUMENT POINTING SYSTEM (IPS). THE TELESCOPE HAS AN OCCULTING MIRROR AT THE PRIMARY FOCUS THAT REFLECTS AWAY ALL BUT A 5 X 15 ARC-MIN PORTION OF THE SOLAR IMAGE THAT THEN PASSES THROUGH AN APERTURE TO STRIKE A SECONDARY MIRROR THAT RE-IMAGES IT ONTO THE UV WADSWORTH SPECTROGRAPHIC SLIT PLATE. THE SECONDARY MIRROR RECEIVES LESS THAN ONE SOLAR CONSTANT OF ILLUMINATION. THE SPECTRAL RESOLUTION IS 50 MILLIANGSTROMS, AND THE SPATIAL RESOLUTION IS 1 ARC S. THE ROLL FILM CAMERA HOLDS 1000 EXPOSURES OF TYPE 101 FILM.

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM)

NSDDC ID- SPALAB2-11

INVESTIGATIVE PROGRAM
CODE 51

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER	US NAVAL RESEARCH LAB
O1 - J.D.F. BARTOE	US NAVAL RESEARCH LAB
O1 - D.K. PRINZ	US NAVAL RESEARCH LAB
O1 - R.E. VAN HOOSIER	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO IMPROVE THE ACCURACY OF KNOWLEDGE OF THE ABSOLUTE SOLAR FLUXES; (2) TO PROVIDE A HIGHLY ACCURATE TRACEABILITY OF SOLAR FLUXES TO A VARIETY OF UV RADIATION STANDARDS TO ESTABLISH LONG-TERM (SOLAR CYCLE) VARIATIONS; AND (3) TO MEASURE THE VARIABILITY OF SOLAR FLUXES IN THE WAVELENGTH RANGE OF 120-400 NANOMETERS DURING SEVERAL TIME PERIODS, RANGING FROM FLARE-PRODUCED CHANGES TO THE VARIABILITY FROM SOLAR ROTATION. IT IS DESIRED TO (A) IMPROVE THE ABSOLUTE ACCURACY OF SOLAR CONTINUUM IRRADIANCE MEASUREMENTS IN THIS WAVELENGTH RANGE WITH A GOAL OF PLUS OR MINUS 6 TO 10 PERCENT (WAVELENGTH-DEPENDENT), (B) MEASURE WITH HIGH ACCURACY THE INTENSITIES OF THE CONTINUUM BELOW 200 NANOMETERS RELATIVE TO THE INTENSITIES OF THE CONTINUUM ABOVE 200 NANOMETERS WITH A GOAL OF PLUS OR MINUS 1 PERCENT, (C) PERFORM HIGH-ACCURACY MEASUREMENTS OF THE INTENSITIES OF SOLAR EMISSION LINES RELATIVE TO THE STABLE SOLAR CONTINUUM ABOVE 200 NANOMETERS WITH A GOAL OF PLUS OR MINUS 1 TO 5 PERCENT (WAVELENGTH-DEPENDENT), AND (D) IMPROVE THE ABSOLUTE ACCURACY OF SOLAR EMISSION LINE IRRADIANCE MEASUREMENTS IN THE 120- TO

400-NANOMETER REGION WITH A GOAL OF PLUS OR MINUS 6 TO 10 PERCENT (WAVELENGTH-DEPENDENT). THE INSTRUMENTATION CONSISTS OF A SOLAR UV SPECTRAL IRRADIANCE MONITOR. THE MONITOR CONSISTS OF TWO IDENTICAL DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS (FIVE PHOTODIODES AND TWO PHOTON COUNTERS), AND A UV CALIBRATION LIGHT SOURCE. THEY ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON TO ELIMINATE THE EFFECTS OF CONTAMINATION FROM HIGH VACUUM OUTGASSING. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY DURING THE DAYLIGHT PORTION OF THE SOLAR-POINTED ORBIT FOR MEASURING SHORT-TIME VARIATIONS OF THE UV SOLAR FLUX (FLARE-RELATED AND SLOWLY VARYING COMPONENT). THE OTHER SPECTROMETER IS USED ONLY ONCE A DAY TO TRACK ANY CHANGE IN SENSITIVITY OF THE FIRST SPECTROMETER. TWO OF THE FIVE PHOTODIODES ARE USED ONLY ONCE A DAY. A DEUTERIUM LAMP CALIBRATED IN SPECTRAL IRRADIANCE IS USED AS THE TRANSFER STANDARD SOURCE FOR DAILY IN-FLIGHT CALIBRATION AND STABILITY TRACKING OF BOTH SPECTROMETERS AND ALL SEVEN DETECTORS. THE TWO PHOTON COUNTERS OBTAIN A SPECTRAL RESOLUTION OF 0.1 NANOMETER OVER THE WHOLE WAVELENGTH RANGE, WHILE 5-NANOMETER RESOLUTION IS OBTAINED WITH THE FIVE PHOTODIODES. A MICROPROCESSOR CONTROLS ALL INSTRUMENT FUNCTIONS BY PROGRAM INSTRUCTION. CHANNELS MONITOR THE 121.6-NANOMETER LINE (LYMAN ALPHA) AND SEVEN SEGMENTS OF THE CONTINUUM FROM 145 TO 390 NANOMETERS. EIGHT NARROW-BAND CHANNELS (0.1-NANOMETER RESOLUTION) ARE MONITORED CONTINUOUSLY AND SCANNED IN FIVE 0.1-NANOMETER STEPS. IN THE SPECTRAL SCAN MODE (ONCE A DAY) THE SPECTRUM FROM 120 TO 400 NANOMETERS IS SCANNED AT 0.1-NANOMETER RESOLUTION. IN THE NARROW-BAND MODE THE SOLAR SPECTRUM AND THE DEUTERIUM LAMP ARE SCANNED WITH BOTH SPECTROMETERS; BOTH ARE MONITORED IN THE BROAD-BAND MODE.

----- SPACELAB 2, COMLES-----

INVESTIGATION NAME- INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION

NSDDC ID- SPALAB2-02

INVESTIGATIVE PROGRAM
CODE 50

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - J.R. COMLES	U OF HOUSTON
O1 - H.W. SCHEID	U OF HOUSTON

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO ESTABLISH THE EFFECT OF OXYGEN ON LIGNIFICATION IN PLANT TISSUE SUBJECTED TO A WEIGHTLESS ENVIRONMENT AND TO MEASURE THE RELATIVE AMOUNT OF AROMATIC BIOSYNTHESIS UNDER DIFFERENT OXYGEN ENVIRONMENTS. THE INVESTIGATION DISTINGUISHES BETWEEN TWO KNOWN FACTORS, OXYGEN AND GRAVITY, THAT INFLUENCE LIGNIFICATION IN PLANTS. SELECTED PREREGIMATED SEEDS ARE PLANTED IN METABOLIC CHAMBERS AND GERMINATED JUST PRIOR TO LAUNCH. THE CHAMBERS ARE CLOSED AND THE ATMOSPHERIC COMPOSITION IS ADJUSTED BY FLUSHING KNOWN GAS MIXTURES THROUGH RUBBER SEPTA IN THE CHAMBER WALLS. THE O2 CONCENTRATIONS ARE 21 PERCENT (FOR THE CONTROL), 10 PERCENT, AND 5 PERCENT. EACH OXYGEN CONCENTRATION IS DUPLICATED IN ANOTHER CHAMBER MODULE. MERCURY VAPOR LAMPS ARE USED TO SIMULATE SUNLIGHT DURING PROGRAMMED DAY/NIGHT CYCLES THROUGHOUT THE MISSION. THE INVESTIGATION IS ALSO DUPLICATED ON EARTH AT 1 GRAVITY AND ON A CLINOSTAT (GROUND CONTROLS).

----- SPACELAB 2, FAZIO-----

INVESTIGATION NAME- SMALL HELIUM-COOLED INFRARED TELESCOPE

NSDDC ID- SPALAB2-05

INVESTIGATIVE PROGRAM
CODE 5C

INVESTIGATION DISCIPLINE(S)
DUST
ZODIACAL LIGHT
ASTRONOMY

PERSONNEL

PI - G.G. FAZIO	SAC
O1 - M.F. HOFFMANN	U OF ARIZONA
O1 - D.E. KLEINMANN	SAC
O1 - F.J. LOW	U OF ARIZONA
O1 - G.M. RIEKE	U OF ARIZONA
O1 - M.A. TRAUB	SAC
O1 - E.W. URBAN	NASA-MSFC

BRIEF DESCRIPTION

THIS MULTIDISCIPLINARY INVESTIGATION INVOLVES BOTH SCIENTIFIC AND TECHNICAL GOALS. THE SCIENTIFIC OBJECTIVES ARE AS FOLLOWS: (1) MEASUREMENT AND MAPPING OF EXTENDED LOW-SURFACE BRIGHTNESS INFRARED EMISSION FROM THE GALAXY. THE EXPERIMENT IS 500 TIMES MORE SENSITIVE THAN CURRENT BALLOON EXPERIMENTS AT 500 MICROMETERS, THUS MAKING POSSIBLE EXTENSIVE MEASUREMENT OF QUANTITY, DISTRIBUTION, AND TEMPERATURES OF GALACTIC DUST AND STRUCTURE; (2) MEASUREMENT OF DIFFUSE EMISSION FROM INTERGALACTIC MATERIAL AND/OR GALAXIES AND QUASARS; (3) MEASUREMENT OF THE ZODIACAL DUST EMISSION, ESPECIALLY IF THE H2O COLUMN DENSITY CAN BE HELD TO LESS THAN 1.E-12 MOLECULES/CM; AND (4) MEASUREMENT OF A LARGE NUMBER OF DISCRETE INFRARED SOURCES THAT OVERLAP WITH THE IRAS RESULTS. SPATIAL FILTERING PROVIDES MEASUREMENTS OF THE FLUX, SPECTRAL CHARACTERISTICS, POSITIONS, AND SIZES OF DISCRETE SOURCES WITH HIGH SENSITIVITY. TECHNICAL OBJECTIVES CONCERNED WITH THE MEASUREMENT OF THE NATURAL AND SPACECRAFT-INDUCED INFRARED BACKGROUND AND THE DETERMINATION OF SUITABLE

TECHNIQUES FOR THE IN-SPACE USE OF SUPERFLUID HELIUM AND CRYOGENIC TELESCOPES ARE AS FOLLOWS: (1) TO TAKE ENVIRONMENTAL MEASUREMENTS OF H_2O , CO_2 , OTHER INFRARED-ACTIVE MOLECULES, DUST PARTICLES, THE EFFECTS OF MOLECULAR DEPOSITION AND COSMIC RAYS, AND THE EFFECTS FROM THE SHUTTLE ENVIRONMENT ON THE PERFORMANCE OF COOLED INFRARED TELESCOPES; (2) TO PROVE OUT THE DESIGN OF COOLED INFRARED TELESCOPES; AND (3) TO DEMONSTRATE THE PERFORMANCE OF A LARGE SUPERFLUID HELIUM DEWAR SYSTEM AND MEASURE CERTAIN PROPERTIES OF IT IN SPACE. THE INSTRUMENTATION CONSISTS OF A SMALL HERSCHELIAN TELESCOPE (15 CM IN DIAMETER WITH AN F/4 OFF AXIS) COOLED TO 3 DEG K. IT SCANS AT THE RATE OF 6 DEG/S AND COVERS A 90-DEG ARC ACROSS THE SVT. THE FOCAL PLANE CONTAINS 10 DETECTORS, 9 OF WHICH COVER THE REGION FROM 4 TO 120 MICROMETERS IN THREE NON-OVERLAPPING BROAD BANDS (4 TO 9, 12 TO 24, AND 50 TO 120 MICROMETERS). ONE DETECTOR HAS A NARROW-BAND RESPONSE AT THE H_2O AND CO_2 BAND LOCATIONS (6 TO 7 AND 14 TO 16 MICROMETERS). THE DETECTORS COVER A FULL 3 DEG PERPENDICULAR TO THE SCAN DIRECTION. THERE IS ALSO A MOVABLE COLD SHUTTER TO PROVIDE AN ABSOLUTE ZERO FLUX REFERENCE FOR EACH BAND. THE STORED LIQUID HELIUM COOLING SYSTEM IS COMPOSED OF A LIQUID HELIUM DEWAR CONTAINING LIQUID HELIUM AT 1.5 DEG K, A TRANSFER LINE ASSEMBLY, A VAPOR-COOLED TELESCOPE CRYOSTAT, AND A CRYOSTAT VACUUM COVER.

----- SPACELAB 2, GABRIEL -----

INVESTIGATION NAME- SOLAR CORONAL HELIUM ABUNDANCE

NSSDC ID- SPALAB2-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - A.H. GABRIEL	RUTHERFORD/APPLTON LAB
PI - J.L. FULMARE	U COLLEGE LONDON
OI - B.E. PATCHETT	RUTHERFORD/APPLTON LAB
OI - K. STRONG	U COLLEGE LONDON

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO DETERMINE THE RELATIVE ABUNDANCE OF HELIUM TO HYDROGEN IN THE SOLAR CORONA FROM THE MEASUREMENT OF THE PHOTOEXCITATION OF HYDROGEN LYMAN ALPHA AT 121.6 NANOMETERS AND HELIUM II AT 30.4 NANOMETERS; (2) TO DETERMINE THE FUNDAMENTAL PARAMETERS OF THE CORONAL PLASMA SUCH AS ELECTRON DENSITY, TEMPERATURE, AND IONIZATION BALANCE AS A FUNCTION OF RADIAL DISTANCE ABOVE THE LIMB; AND (3) TO CONSTRUCT A CONTOUR MAP IN THE INTENSITY OF SELECTED EXTREME UV LINES AND IN PHYSICAL PARAMETERS (ELECTRON TEMPERATURE AND DENSITY) OF CORONAL FEATURES WITH 15-ARC-S RESOLUTION, BOTH ON THE DISK AND ABOVE THE LIMB OF THE SUN. THE INSTRUMENTATION IS COMPOSED OF A 1-M, GRAZING-INCIDENCE SPECTROMETER USING A 1200-LINE/MM RULED GRATING. THE SUN'S IMAGE IS FOCUSED ONTO THE ENTRANCE SLIT PLANE BY MEANS OF A 28-CM FOCAL LENGTH, GRAZING-INCIDENCE TELESCOPE OF WOLTER TYPE 1 SECTOR DESIGN. THE SLIT IS ORIENTED TANGENTIALLY TO THE SOLAR LIMB, AND CAN BE STEPPED RADIALLY IN STEPS OF 1 ARC MIN FROM A POSITION ON THE SOLAR DISK TO 8 ARC MIN ABOVE THE LIMB BY A SERVO-DRIVEN LINEAR TRAVERSE ON THE TELESCOPE MIRROR. TWELVE CHANNEL ELECTRON MULTIPLIERS ARE POSITIONED BEHIND DIFFERENT EXIT SLITS AT PRE-SELECTED SPECTRAL POSITIONS ON THE ROWLAND CIRCLE. TWO POSITIONS ARE AT 121.6 NANOMETERS AND 30.4 NANOMETERS (FOR H/H_2 ABUNDANCES). THE OTHER SLITS COVER ASSOCIATED PARAMETERS, SUCH AS THE TEMPERATURE AND DENSITY OF THE SOLAR ATMOSPHERE. SOME SLITS HAVE ATTENUATING FILTERS FOR DYNAMIC RANGE OF THE RATIO OF THE DISK INTENSITY TO THAT OF THE CORONA AT 3.5.E5 KM. FILTERS ARE REMOVED FOR LIMB MEASUREMENTS. A SMALL OSCILLATORY ROTATION OF THE GRATING ABOUT AN AXIS THROUGH THE ENTRANCE SLIT PERMITS A SMALL WAVELENGTH SCAN TO DISCRIMINATE AGAINST SCATTERED STRAY LIGHT. AN AUXILIARY INSTRUMENT MONITORS CHANGES IN HE II 30.4 NANOMETER INTENSITY CAUSED BY ATMOSPHERIC ABSORPTION EFFECTS RESULTING FROM SPACECRAFT HEIGHT OR CHANGES OF LINE OF SIGHT TO THE SUN. A ZERO-ORDER DETECTOR MONITORS THE SOLAR LIMB CROSSINGS AND GIVES DATA ON SHORT-TERM INTENSITY VARIATIONS IN STARS FOR WAVELENGTHS SHORTER THAN 140 NANOMETERS. SIGNALS ARE COUNTED, MULTIPLIED, AND INTERFACED WITH THE SPACELAB TELEMETRY SYSTEM FOR TRANSMISSION TO THE GROUND. THE POINTING ACCURACY IS 15 ARC S AND THE POINTING STABILITY IS 5 ARC S.

----- SPACELAB 2, MASON -----

INVESTIGATION NAME- DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G

NSSDC ID- SPALAB2-13

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - P.V. MASON	NASA-JPL
OI - D.J. COLLINS	NASA-JPL
OI - D.D. ELLEMAN	NASA-JPL
OI - D. PETRAC	NASA-JPL
OI - M.M. SAFFREN	NASA-JPL
OI - T.G. WANG	NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO DETERMINE THE FLUID AND THERMAL PROPERTIES REQUIRED FOR THE DESIGN OF PLANNED SPACE EXPERIMENTS USING SUPERFLUID HELIUM (2.2 DEG K) AS A CRYOGEN. TO ADVANCE SCIENTIFIC UNDERSTANDING OF THE INTERACTIONS BETWEEN SUPERFLUID AND NORMAL LIQUID HELIUM, AND TO DEMONSTRATE THE USE OF SUPERFLUID HELIUM AS A CRYOGEN IN ZERO GRAVITY. SPECIFICALLY, THE OBJECTIVES ARE (1) TO TAKE DETAILED MEASUREMENTS OF LOW-FREQUENCY SLOSH MODES OF SUPERFLUID HELIUM; (2) TO TAKE PRECISE MEASUREMENTS OF THE THERMAL FLUCTUATIONS AND DISTRIBUTIONS IN SUPERFLUID HELIUM IN ZERO GRAVITY. THE INVESTIGATION PERFORMS AT THE MICROMELVIN LEVEL OVER A FREQUENCY RANGE OF 0-100 HZ; (3) TO DEVELOP AN APPARATUS TO MEASURE THE VELOCITIES AND ATTENUATION OF QUANTIZED SURFACE WAVES IN SUPERFLUID FILMS AT FREQUENCIES SO HIGH THAT SURFACE TENSION FORCES DOMINATE OVER GRAVITY FORCES AND ATTENUATION EFFECTS ON EARTH PRECLUDE THEIR MEASUREMENT; AND (4) TO OBTAIN SUPERFLUID HELIUM CRYOSTAT PERFORMANCE DATA FOR FUTURE SPACE APPLICATIONS. THE INSTRUMENTATION CONSISTS OF AN INSTRUMENTED CRYOSTAT (CONTAINING AN INVESTIGATION PACKAGE INSIDE) AND A SUPPORT ELECTRONICS PACKAGE. THE CAVITY IS SURROUNDED BY A 90-LITER SUPERFLUID HELIUM TOROID AND A MULTILAYER SUPER INSULATION SYSTEM SPACED BY HELIUM VAPOR-COOLED SHIELDS. THE DEWAR OPERATES IN BOTH UPRIGHT AND HORIZONTAL CONFIGURATIONS. THE CRYOSTAT IS INSTRUMENTED WITH GERMANIUM AND THERMOCOUPLE TEMPERATURE SENSORS TO MONITOR THE CHAMBER TEMPERATURES AND THE SUPERFLUID PLUG AND INSULATION PERFORMANCE. ACCELEROMETERS MONITOR VIBRATION EFFECTS IN ORDER TO CORRELATE WITH THE BULK BEHAVIOR OBSERVATIONS.

----- SPACELAB 2, MENDILLO -----

INVESTIGATION NAME- PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY

NSSDC ID- SPALAB2-04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M. MENDILLO	BOSTON U
PI - A.V. DAROSA	STANFORD U
OI - M.D. PAPAGIANNIS	BOSTON U
OI - M.C. KELLEY	CORNELL U
OI - R.A. HELLWELL	STANFORD U
OI - P.A. BERNHARDT	STANFORD U
OI - M.B. PONGRATZ	LOS ALAMOS SCI LAB
OI - G.W. SMITH	LOS ALAMOS SCI LAB
OI - D.J. BAKER	UTAH STATE U
OI - R.D. HARRIS	UTAH STATE U
OI - D.T. FARLEY	CORNELL U
OI - D. ANDERSON	NOAA-SEL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO STUDY THE IONOSPHERIC (F-REGION) DEPLETION AND RELATED EFFECTS CAUSED BY SHUTTLE THRUSTER FIRINGS IN MID-LATITUDES, (2) TO DETERMINE THE NATURE OF THE PHYSICAL PROCESSES GOVERNING THE IONOSPHERIC STRUCTURE, INCLUDING DIFFUSION COEFFICIENTS, CHEMICAL REACTION RATES, NEUTRAL WIND VELOCITIES, ELECTRIC FIELDS, ELECTRON COOLING RATES, AND LIMITING FLUXES, (3) TO PRODUCE CONTROLLED PERTURBATIONS IN THE PLASMASPHERE TO EXAMINE THE FORMATION OF ARTIFICIAL VLF DUCTS AND THE EQUATORIAL SPREAD F, AND (4) TO USE THE IONOSPHERIC DEPLETION REGION (HOLE) TO CONDUCT GROUND-BASED, HIGH-RESOLUTION, RADIO ASTRONOMICAL STUDIES. DURING FLIGHT, THRUST FIRINGS FROM THE ORBITAL MANEUVERING SYSTEM RELEASE A MINIMUM OF 200 KG OF EXHAUST VAPORS OVER EACH OF THE RADIO ASTRONOMICAL SITES OF WESTFORD, MA; ARECIBO, PUERTO RICO; ROBERVAL, QUEBEC; JICAMARCA; PERU; AND HOBART, AUSTRALIA. AIRGLOW OBSERVATIONS ARE ATTEMPTED WITH A HIGH-RESOLUTION FABRY-PEROT INTERFEROMETER AT 630 NANOMETERS CAPABLE OF DISCRIMINATING BETWEEN ATMOSPHERIC EMISSIONS AND SOLAR BACKGROUND RADIATION. RADAR AND OPTICAL MEANS ARE USED TO MEASURE TEMPERATURE FLUCTUATIONS AND ION DENSITY WHILE ELECTRON CONTENT MEASUREMENTS ARE MADE FROM SATELLITE SIGNALS PASSING THROUGH THE MODIFIED REGION. VLF PROPAGATION EFFECTS ARE EXAMINED BETWEEN ROBERVAL, QUEBEC AND SIPLE, ANTARCTICA TO MEASURE THE EFFECTS OF ARTIFICIALLY PRODUCED F-REGION GRADIENTS ON THE IONOSPHERIC PROPAGATION OF VLF SIGNALS. COLUMNAR ELECTRON CONTENT MEASUREMENTS ARE CONDUCTED USING POLARIMETERS IN CONJUNCTION WITH GEOSTATIONARY SATELLITE BEACONS. OPTICAL OBSERVATIONS PROVIDE INFORMATION ON LOW-LATITUDE NEUTRAL WIND VELOCITIES AND ELECTRIC FIELDS. LOW-FREQUENCY RADIO ASTRONOMY OBSERVATIONS MEASURE THE GALACTIC RADIO NOISE IN THE 1 TO 5 MHZ RANGE, WHERE THE PEAK OF GALACTIC EMISSION OCCURS, AND INTRIGUING RADIO SOURCES; E.G., VELA AND THE GUN NEBULA.

----- SPACELAB 2, NEVER -----

INVESTIGATION NAME- ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI

NSSDC ID- SPALAB2-06

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL
 PI - P. MEYER U OF CHICAGO
 PI - D. MULLER U OF CHICAGO
 CI - J.E. LAMPORT U OF CHICAGO
 CI - J. L'HEUREUX U OF CHICAGO

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MAKE A PRECISE DETERMINATION OF THE CHARGE COMPOSITION AND INDIVIDUAL ENERGY SPECTRA OF COSMIC RAY NUCLEI FROM LITHIUM TO IRON, COVERING THE ENERGY RANGE FROM 50 TO 2000 GEV/NUCLEON. THE INVESTIGATION EXPOSES TO DEEP SPACE AN INSTRUMENT OF LARGE VOLUME AND CONSIDERABLE MASS FOR AN EXTENDED TIME PERIOD WITHOUT THE INFLUENCE OF AN OVERLYING ATMOSPHERE. THE INSTRUMENT FOR CHARGE COMPOSITION IS A TELESCOPE OF TWO PLASTIC SCINTILLATORS; FOR THE ENERGY MEASUREMENTS, TWO GAS CERENKOV COUNTERS COVERING THE RANGE FROM 50 TO 150 GEV/NUCLEON AND A TRANSITION RADIATION DETECTOR SYSTEM FOR THE REGION FROM 400 TO 2000 GEV/NUCLEON ARE USED. THE DETECTOR ELEMENTS ARE CONTAINED IN A CYLINDRICAL PRESSURIZED SHELL WITH HEMISPHERICAL TOP AND BOTTOM COVERS (2.8 M IN DIAMETER WITH A MAXIMUM HEIGHT OF 3.7 M). ALL DETECTOR ELEMENTS OCCUPY AREAS 2 X 2 M. THE TRANSITION RADIATION DETECTOR CONSISTS OF SIX RADIATORS (WITH A TOTAL OF 10,000 PLASTIC FOILS OF 5-MICROMETER THICKNESS) AND SIX REMON-FILLED MULTIWIRED PROPORTIONAL CHAMBERS, AND IS POSITIONED IN THE CENTER OF THE INSTRUMENT. TWO SCINTILLATORS ARE ADJACENT TO BOTH ENDS, AND ARE HOUSED IN LIGHT INTEGRATION BORES. THE TWO GAS CERENKOV COUNTERS FILL THE REMAINING SPACE BETWEEN THE SCINTILLATORS AND HEMISPHERICAL LIDS OF THE PRESSURIZED CONTAINER. THEY ARE FILLED WITH GASES AT ATMOSPHERIC PRESSURE, AND THE INNER WALLS ARE COATED WITH WHITE HIGHLY REFLECTIVE PAINT. THERE IS A GEOMETRIC FACTOR OF 5 SQ M-SR FOR THE TRANSITION DETECTOR AND 1 SQ M-SR FOR THE CERENKOV COUNTER TELESCOPE. TO DETECT THE LIGHT OF AN INCIDENT PARTICLE, 24 PHOTOMULTIPLIER TUBES WITH PHOTOCATHODES 12.7 CM (5 IN.) IN DIAMETER ARE USED. FAST 5.08-CM (2-IN.) PHOTOMULTIPLIERS ARE COUPLED DIRECTLY TO THE SCINTILLATORS, WHICH ARE USED FOR TIME DELAYS BETWEEN RESPONSES RECORDED BY EACH SCINTILLATOR; PARTICLES MUST PENETRATE BOTH. CERENKOV RADIATION IS DETECTED BY 50 TUBES WITH 12.7-CM (5-IN.) WINDOWS. AN ELECTRONICS PACKAGE COLLECTS THE INFORMATION FROM THE VARIOUS SENSORS AND FORMATS IT FOR GROUND TRANSMISSION.

----- SPACELAB 2, SCHNOES-----

INVESTIGATION NAME- VITAMIN D METABOLITES AND BONE DEMINERALIZATION

NSSDC ID- SPALAB2-01 INVESTIGATIVE PROGRAM CODE 5B

INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL
 PI - M.K. SCHNOES U OF WISCONSIN
 CI - J.F. DE LUCA U OF WISCONSIN
 CI - E. HULTON NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT WILL MEASURE QUANTITATIVELY THE BLOOD LEVELS OF BIOLOGICALLY ACTIVE VITAMIN D METABOLITES OF THE FLIGHT CREW MEMBERS TO ESTABLISH WHETHER THESE DERANGEMENTS OF MINERAL (SPECIFICALLY CALCIUM) METABOLISM REFLECT THEMSELVES IN ANY WAY IN A MODULATION OF VITAMIN D METABOLISM TO ITS VARIOUS METABOLITES. THE EXPERIMENT IS COMPOSED OF A DEVELOPMENTAL PHASE AND A FINAL PHASE. AS PART OF THE DEVELOPMENTAL PHASE, EXISTING ANALYSIS METHODS FOR THE VITAMIN D METABOLITES WILL BE REFINED AND NEW METHODS DEVELOPED. THE FINAL PHASE WILL CONSIST OF THE QUANTITATIVE ANALYSIS OF THE VITAMIN D METABOLITES IN PLASMA SAMPLES OF THE SPACELAB 2 CREW COLLECTED PRIOR TO, DURING, AND POST FLIGHT. FLIGHT HARDWARE CONSISTS OF TWO BLOOD COLLECTION KITS, A CENTRIFUGE TO PREPARE THE PLASMA, AND A -20 DEG C FREEZER FOR SAMPLE STORAGE. ALL THE EQUIPMENT WILL BE LOCATED IN THE ORBITER MID-DECK.

----- SPACELAB 2, SHAWHAN-----

INVESTIGATION NAME- EJECTABLE PLASMA DIAGNOSTICS PACKAGE

NSSDC ID- SPALAB2-03 INVESTIGATIVE PROGRAM CODE 5T

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - S.D. SHAWHAN U OF IOWA
 CI - L.A. FRANK U OF IOWA
 CI - D.A. GURNETT U OF IOWA
 CI - M. D'ANGELO U OF IOWA
 CI - M.C. BRINTON NASA-GSFC

BRIEF DESCRIPTION

THE PLASMA DIAGNOSTIC PACKAGE (PDP) IS A FULLY INSTRUMENTED EJECTABLE SUBSATELLITE. DURING THE MISSION IT WILL OPERATE WITHIN THE PAYLOAD BAY, ON THE REMOTE MANIPULATOR SYSTEM (RMS), AND AS A FREE FLYER. THE OBJECTIVES INCLUDE THE FOLLOWING: (1) TO STUDY ORBITER-MAGNETOPLASMA INTERACTIONS IN TERMS OF DENSITY WAVES, DC ELECTRIC FIELDS, ENERGIZED PLASMA, AND A VARIETY OF POSSIBLE WAVE-PARTICLE INSTABILITIES; (2) TO PROVIDE IN SITU MEASUREMENTS OF THE IONOSPHERIC PLASMA 'HOLES' INDUCED BY THE ORBITER ENGINE BURNS IN SUPPORT OF THE GROUND

RADAR OBSERVATIONS OF SPACELAB 2 EXPERIMENT 4 (SPALAB2-04); (3) TO MEASURE FIELDS, WAVES, AND PLASMA MODIFICATIONS INDUCED BY THE ORBITER/SPACELAB OPERATING SYSTEMS IN THE SPACELAB BAY AND OUT TO DISTANCES OF 10 KM; AND (4) TO OBSERVE NATURAL WAVES, FIELDS, AND PLASMAS IN THE UNPERTURBED MAGNETOSPHERE. INSTRUMENTS TO BE FLOWN INCLUDE THE FOLLOWING: (1) A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER TO PROVIDE ELECTRON AND PROTON DISTRIBUTION FUNCTIONS FROM 2 EV TO 50 KEV; (2) A PLASMA WAVE ANALYZER/ELECTRIC DIPOLE AND MAGNETIC SPINCH COIL SENSORS TO GIVE COMPONENTS OF ELECTROSTATIC AND ELECTROMAGNETIC WAVES FROM 5 HZ TO 30 MHZ; (3) A DC ELECTRIC FIELD METER FOR SENSING COMPONENTS OF THE DC ELECTRIC FIELD OVER THE RANGE FROM 2 TO 2000 MV/M; (4) A TRIAXIAL FLUXGATE MAGNETOMETER TO MEASURE THE DC MAGNETIC FIELD DISTRIBUTION IN THE VICINITY OF THE ORBITER; (5) A LANGMUIR PROBE TO MEASURE ELECTRON DENSITY IN THE REGION 1.04 TO 1.07 PER CU CM AND ELECTRON TEMPERATURE FROM 500 TO 5000 DEG K; (6) A RETARDING POTENTIAL ANALYZER AND DIFFERENTIAL FLUX ANALYZER TO DETERMINE THE ENERGY DISTRIBUTION AND STREAMING VELOCITY DIRECTION FOR PLASMA IONS WITH ENERGIES LT. 16 EV, NUMBER DENSITIES OF 1.02 TO 1.07 PER CUBIC CM, TEMPERATURES FROM 500 TO 1.06 DEG K, AND VELOCITIES UP TO 15 KM/S WITHIN PLUS OR MINUS 50 DEG OF THE INSTRUMENT PLANE; AND (7) AN ION MASS SPECTROMETER FOR MEASURING FROM 1 TO 64 AMU AND DENSITIES OF 20 TO 2.06 PER CUBIC CM. IN ADDITION TO THE PDP, THE EXPERIMENT CONSISTS OF A SPECIAL PURPOSE END EFFECTOR, A RELEASE MECHANISM, A RECEIVER AND DATA PROCESSING ASSEMBLY, AND AN R.F. ANTENNA ASSEMBLY.

----- SPACELAB 2, TITLE-----

INVESTIGATION NAME- SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM

NSSDC ID- SPALAB2-08 INVESTIGATIVE PROGRAM CODE 5T

INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - A.M. TITLE LOCKHEED PALO ALTO
 CI - M.E. RAMSEY LOCKHEED PALO ALTO
 CI - R.C. SMITHSON LOCKHEED PALO ALTO
 CI - S.A. SCHOOLMAN LOCKHEED PALO ALTO
 CI - T.D. TARBELL LOCKHEED PALO ALTO
 CI - L.W. ACTON LOCKHEED PALO ALTO
 CI - M.C. LIVINGSTON KITT PEAK NATL OBS
 CI - J.W. HARVEY KITT PEAK NATL OBS
 CI - R.W. MILKEY KITT PEAK NATL OBS
 CI - G.W. SIMON SACRAMENTO PEAK OBS
 CI - S.P. WORDEN SACRAMENTO PEAK OBS
 CI - J.B. ZIRKER SACRAMENTO PEAK OBS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO MEASURE MAGNETIC AND VELOCITY FIELDS IN THE SOLAR ATMOSPHERE WITH HIGH SPATIAL RESOLUTION AND DEDUCE THE SMALL-SCALE STRUCTURE AND EVOLUTION OF THESE FIELDS ON THE 10-TO 20-MIN TIME SCALE OF SOLAR GRANULATION; (2) TO FOLLOW THE EVOLUTION OF SOLAR MAGNETIC STRUCTURES OVER PERIODS OF 20 TO 40 H IN ORDER TO DETERMINE HOW THE MAGNETIC ELEMENTS COUPLE TO THE SUPERGRANULE VELOCITY PATTERNS AND BY WHAT MECHANISMS FIELD DIFFUSION AND DISAPPEARANCE OCCUR; (3) TO STUDY WITH HIGH TEMPORAL AND SPATIAL RESOLUTION THE MAGNETIC FIELD CHANGES ASSOCIATED WITH TRANSIENT EVENTS SUCH AS FLARES, AND TO ISOLATE AND FOLLOW THE BIRTH OF SUNSPOTS, PORES, AND EPHMERAL REGIONS; (4) TO DEVELOP THE ELEMENTS OF AN H-ALPHA MAGNETOGRAPH/TELESCOPE THAT CAN BE REFLOWN; AND (5) TO PROVIDE A TEST OF THE POINTING ACCURACY AND STABILITY OF THE INSTRUMENT POINTING SYSTEM (IPS) TO SUBARC-SECOND ACCURACY. THE INSTRUMENTATION CONSISTS OF A SOLAR OPTICAL UNIVERSAL POLARIMETER MOUNTED ON THE IPS. THE POLARIMETER IS COMPOSED OF A TUNABLE BIREFRINGENT FILT WITH A BANDPASS OF 60 MILLIANGSTROMS USING ASSOCIATED BLOCKIN FILTERS TO PERMIT THE FILTER TO OPERATE IN EIGHT SPECTRAL BA. EACH ABOUT 0.8 NANOMETER WIDE. A FILM CAMERA TAKE ECT FILTERGRAMS THROUGH THE TUNABLE FILTER. A CHARGE INJECTION DEVICE (CID)-ARRAY CAMERA TAKES PHOTOELECTRIC FILTERGRAMS WITH A HIGH SIGNAL-TO-NOISE RATIO THROUGH THE TUNABLE FILTERS. A VIDEO PROCESSOR STORES IMAGES IN DIGITAL MEMORY AND A HIGH-RESOLUTION, WHITE-LIGHT SYSTEM WITH FILM CAMERA AND VIDEO DISPLAY IS USED FOR ACQUISITION OF ACCURATE POINTING DATA. THE FILTER SYSTEMS ARE INTERFACED TO A 30-CM CASSEGRAIN TELESCOPE WITH OFFSET POINTING CAPABILITY. ROTATABLE WEDGES ARE PLACED IN FRONT OF THE TELESCOPE TO ALLOW IT TO OBSERVE ANY DESIRED POINT ON THE SUN. A GUIDER ASSEMBLY COMPENSATES FOR HIGH-SPEED IMAGE MOTION. TO RECORD A COMPLETE LINE PROFILE, FILTERGRAMS ARE TAKEN IN ORTHOGONAL POLARIZATIONS AT 15 WAVELENGTHS SPACED 2 TO 3.5 PICOMETERS APART AND IN THE NEAR CONTINUUM. THEY ARE RECORDED ON 80115 FILM WITH A RESOLUTION ELEMENT OF 50 MICROMETERS PER SIDE.

----- SPACELAB 2, WILLMORE-----

INVESTIGATION NAME- HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES

NSSDC ID- SPALAB2-07

INVESTIGATIVE PROGRAM
CODE SC/CO-0P

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL

PI - A.P. WILLMORE	U OF BIRMINGHAM
O1 - D.K. BEDFORD	U OF BIRMINGHAM
O1 - G.F. CARPENTER	U OF BIRMINGHAM
O1 - C.J. EYLES	U OF BIRMINGHAM
O1 - J.R.H. HEARING	U OF BIRMINGHAM
O1 - G.M. SIMMETT	U OF BIRMINGHAM
O1 - G.K. SKINNER	U OF BIRMINGHAM
O1 - J.W.G. WILSON	U OF BIRMINGHAM

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO EXAMINE THE EMISSION FROM CLUSTERS OF GALAXIES IN ORDER TO STUDY THE MECHANISMS INVOLVED IN THEIR EMISSION AND THE POSSIBLE PRE. CE OF AN INTERGALACTIC GAS. THE SPATIAL AND SPECTRAL DISTRIBUTION OF X-RAY FLUX FROM THESE CLUSTERS IN THE ENERGY RANGE FROM 2 TO 20 KEV IS STUDIED. THE INVESTIGATION IS ALSO USED ON OTHER X-RAY SOURCES, SUCH AS THOSE OCCURRING AT THE CENTER OF OUR GALAXY. THESE SOURCES ARE EXTREMELY WEAK AND REQUIRE A POINTING SYSTEM TO ACQUIRE SUFFICIENT OBSERVING TIME. THE INSTRUMENT IS A DOUBLE X-RAY TELESCOPE THAT USES A TECHNIQUE TO PRODUCE X-RAY IMAGES OF SMALL REGIONS OF THE SKY AT HIGHER X-RAY ENERGIES THAN IS POSSIBLE USING CONVENTIONAL METHODS. IT USES A CODED BINARY MASK AND A POSITION-SENSITIVE DETECTOR THAT PRODUCES AN X-RAY MAP OF THE SKY. THE MASK USES A SPECIAL CASE OF THE RANDOM PINHOLE MASK, WHICH PRODUCES AN IMAGE BY DECONVOLVING THE PATTERN OF THE MASK HOLES THAT PRODUCE A SHADOWGRAM ON THE POSITION-SENSITIVE DETECTOR WHEN ILLUMINATED BY RADIATION FROM THE OBJECT. THE TWO TELESCOPES HAVE DIFFERENT RESOLUTIONS. ONE HAS A COARSE RESOLUTION TO DETECT FAINT SOURCES AND AN EXTENDED REGION OF STRONGER SOURCES, WHILE THE OTHER HAS A FINE RESOLUTION THAT RESOLVES FINE DETAILS IN MORE INTENSE REGIONS. THE VALUES ARE 12 X 12 ARC MIN AND 3 X 3 ARC MIN, RESPECTIVELY, AT FULL WIDTH HALF MAXIMUM OF THE RESPONSE AND DO NOT NECESSARILY IMPLY THE LIMITS TO THE FINENESS OF THE DETAIL THAT CAN BE DEDUCED. THE DETECTORS ARE COMPOSED OF MULTIWIRE POSITION-SENSITIVE PROPORTIONAL COUNTERS. ANTI-COINCIDENCE TECHNIQUES ARE USED TO REJECT COSMIC-RAY EVENTS. A MOTORIZED GIMBAL SYSTEM IS USED TO POINT THE TELESCOPE TO WITHIN 0.5 DEG OF ANY ORIENTATION WITH RESPECT TO THE SHUTTLE. A MICROPROCESSOR SYSTEM ACCEPTS THE NOMINAL VEHICLE ATTITUDE TO SELECT A PREPROGRAMMED LIST OF TARGETS AND TO DRIVE THE TELESCOPES. A GYRO PACKAGE FOR POINTING, STAR SENSORS FOR DETERMINATION OF ABSOLUTE DIRECTIONS TO WITHIN 1 ARC MIN, AND STAR FIELD CAMERAS FOR LONG-TERM DRIFT MOTION ARE ALSO PART OF THE INSTRUMENTATION.

***** SPACELAB 3*****

SPACECRAFT COMMON NAME- SPACELAB 3
ALTERNATE NAMES-

NSSDL ID- SPALAB3

LAUNCH DATE- 04/10/84 WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 92. MIN INCLINATION- 57. DEG
PERIAPSIS- 370. KM ALT APOAPSIS- 370. KM ALT

PERSONNEL		
MM - J. CREMIN	NASA-MSFC	
MS - G.M. FICHTL	NASA-MSFC	
MG - R.G. NOBLITT	NASA HEADQUARTERS	
SC - J.S. THEON	NASA HEADQUARTERS	
PM - D.C. JEAN	NASA-MSFC	

BRIEF DESCRIPTION

SPACELAB 3 CONSISTS OF A SPACELAB LONG MODULE AND A PALLET. THE PRIMARY OBJECTIVE OF THE MISSION IS TO CONDUCT APPLICATION, SCIENCE, AND TECHNOLOGY EXPERIMENTATION REQUIRING THE LOW-GRAVITY ENVIRONMENT OF EARTH ORBIT AND EXTENDED-DURATION STABLE VEHICLE ATTITUDE WITH EMPHASIS ON MATERIALS PROCESSING. PAYLOAD SPECIALISTS WILL BE USED IN-ORBIT TO CONDUCT THE SCIENTIFIC INVESTIGATIONS. FOURTEEN INVESTIGATIONS HAVE BEEN SELECTED TO FLY ABOARD THE SPACELAB 3 MISSION. THE EXPERIMENTS REPRESENT A TOTAL OF FIVE DIFFERENT DISCIPLINES, INCLUDING MATERIALS PROCESSING IN SPACE, ENVIRONMENTAL OBSERVATIONS, LIFE SCIENCES, PLASMA PHYSICS, AND TECHNOLOGY RESEARCH. TWELVE OF THE EXPERIMENTS ARE LOCATED IN THE MODULE, AND THREE ARE LOCATED ON THE PALLET IN THE PAYLOAD BAY. THIS IS THE FIRST SPACELAB MISSION IN WHICH A LOW-GRAVITY ENVIRONMENT WILL BE STRICTLY MAINTAINED IN ORBIT.

----- SPACELAB 3, BELOUET-----

INVESTIGATION NAME- MERCURY IODIDE CRYSTAL

NSSDC ID- SPALAB3-22

INVESTIGATIVE PROGRAM

INVESTIGATION DISCIPLINE(S)

PERSONNEL

PI - C. BELOUET LAB D'ELECTR PHYS APPL

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO GROW NEAR-PERFECT SINGLE CRYSTALS OF MERCURY IODIDE (HGIZ). HIGH-QUALITY CRYSTALS OF THIS COMPOSITION CAN LEAD TO IMPROVED RADIATION DETECTORS.

----- SPACELAB 3, BISWAS-----

INVESTIGATION NAME- IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES

NSSDC ID- SPALAB3-15

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - S. BISWAS	TATA INST OF FUND RES
PI - D. LAL	PHYSICAL RESEARCH LAB
O1 - R. COWSIK	TATA INST OF FUND RES
O1 - N. DYRGAPRASAD	TATA INST OF FUND RES
O1 - V. VENKATAVARADAN	TATA INST OF FUND RES
O1 - L. SARKAR	TATA INST OF FUND RES

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE RECENTLY DISCOVERED ANOMALOUS COMPONENT OF LOW-ENERGY GALACTIC COSMIC RAY IONS OF C, N, O, NE, AND CA TO FE OF ENERGY 5 TO 100 MEV PER AMU IN REGARD TO THEIR IONIZATION STATES, COMPOSITION AND INTENSITY, AND TO STUDY THE IONIZATION STATES OF HEAVY ELEMENTS FROM OXYGEN TO IRON IN ENERGETIC SOLAR PARTICLES EMITTED DURING FLARE EVENTS. THE DETECTOR SYSTEM SERVES FOR BOTH STUDIES, AND CONSISTS OF STACKS OF THIN SHEETS OF CELLULOSE NITRATE (CN) AND LEXAN POLYCARBONATE WHICH ARE EFFICIENT LOW-NOISE DETECTORS FOR HEAVY NUCLEI. THE STACKS ARE IN THE SHAPE OF A CYLINDRICAL MODULE WITH A DIAMETER OF 40 CM AND A HEIGHT OF APPROXIMATELY 5 CM.

----- SPACELAB 3, FARMER-----

INVESTIGATION NAME- ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS)

NSSDC ID- SPALAB3-14

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - C.B. FARMER	NASA-JPL
O1 - O. RAPER	NASA-JPL
O1 - R. MORTON	NASA-JPL
O1 - R. BEER	NASA-JPL
O1 - F. TAYLOR	NASA-JPL
O1 - M.T. CHAHINE	NASA-JPL
O1 - R. TOTI	NASA HEADQUARTERS
O1 - R. SCHINDLER	NASA-JPL
O1 - J. BRECKINRIDGE	NASA-JPL
O1 - J.M. SHAW	OHIO STATE U
O1 - J. SUSKIND	NASA-GSFC
O1 - J.M. RUSSELL, SRD	NASA-LARC
O1 - R. ZANDER	U OF LIEGE

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) SL 3 EXPERIMENT IS TO DEMONSTRATE THE CAPABILITY TO MONITOR ENVIRONMENTAL QUALITY BY SURVEYING THE ATMOSPHERE FOR TRACE CONSTITUENTS AND IDENTIFYING THEIR SOURCES, FLOW PATTERNS, AND DECAY MECHANISMS. IN ITS MOST GENERAL FORM, THE ATMOS EXPERIMENT OBJECTIVE IS TO DETERMINE CONCENTRATION PROFILES THROUGH STRATOSPHERIC ALTITUDES (20 TO 80 KM) AT A VERTICAL RESOLUTION OF 2 KM. THE ATMOS INSTRUMENT VIEWS THE SUN THROUGH THE STRATOSPHERE AND MEASURES THE SPECTRAL ABSORPTION OF SOLAR ENERGY. EACH DATA-TAKING RUN IS INITIATED PRIOR TO THE SUN EMERGING FROM OR DISAPPEARING BEHIND THE EARTH. DATA FROM THE INSTRUMENT FOR THESE SUNRISE AND SUNSET LINE ENCOUNTERS ARE INTERFEROGRAMS THAT, WHEN PROCESSED ON THE GROUND, PROVIDE ABSORPTION SPECTRA. THE INSTRUMENT IS A CONTINUOUS-SCANNING FOURIER SPECTROMETER OPERATING IN THE 2 TO 16 MICROMETER WAVELENGTH REGION AND CAPABLE OF GENERATING ONE INTERFEROGRAM EACH SECOND WITH A SPECTRAL RESOLUTION OF 0.01 CM⁻¹. IT IS COMPRISED OF FOUR MAJOR ELEMENTS: A SUN TRACKER, A TELESCOPE, AN INTERFEROMETER, AND A DATA-HANDLING SYSTEM. THE SUN TRACKER AUTOMATICALLY LOCKS ONTO THE SUN AND CORRECTS FOR ANY ORIENTATION CHANGE WITHIN PREDETERMINED LIMITS. THE ENERGY FROM THE SUN TRACKER IS DIRECTED INTO THE OPTICAL SYSTEM AND IS COLLECTED BY AN INFRARED DETECTOR. THE DETECTOR SIGNAL IS AMPLIFIED AND SENT TO THE ELECTRONICS. THESE DATA IN CONJUNCTION WITH ENGINEERING

AND HOUSEKEEPING DATA ARE CONVERTED INTO A SERIAL PCN BIT STREAM IN A FORMAT COMPATIBLE WITH THE SPACELAB HIGH-RATE MULTIPLEXER.

----- SPACELAB 3, HART-----

INVESTIGATION NAME- GEOPHYSICAL FLUID FLOW CELL (GFFC)

NSSDC ID- SPALAB3-10

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.E. HART	U OF COLORADO
O1 - P.A. GILMAN	HIGH ALTITUDE OBS
O1 - G.H. FICHTL	NASA-MSFC
O1 - W. FOWLES	NASA-MSFC

BRIEF DESCRIPTION

THE GOAL IS TO PERFORM BASIC EXPERIMENTS RELATIVE TO THE FLUID MECHANICS ASSOCIATED WITH SPHERICAL CONVECTION PROCESSES WITH A VIEW TOWARD CONFIRMING SPECIFIC THEORETICAL PREDICTIONS RELATED TO THE DYNAMICS OF THE SOLAR CONVECTIVE ZONE AND THE JOVIAN ATMOSPHERE. THE EXPERIMENTS ARE BASED ON FLUID-DYNAMIC SCALING LAWS THAT PERMIT EXPERIMENTS RELEVANT TO GEOPHYSICAL AND ASTRONOMICAL FLUID-DYNAMIC PROCESSES TO BE PERFORMED IN A LABORATORY ENVIRONMENT, SUCH AS THAT OF SPACELAB. THE INSTRUMENT CELL WITHIN WHICH THE FLUID EXPERIMENTS ARE PERFORMED CONSISTS OF A ROTATING SPHERICAL CAPACITOR APPROXIMATELY 6 CM IN DIAMETER WITH A 1-CM GAP. THE FLUID IS A DIELECTRIC SUBSTANCE SUCH THAT UPON APPLICATION OF VOLTAGE ACROSS THE GAP AND A RADIALLY DIRECTED TEMPERATURE GRADIENT, A RADIALLY DIRECTED ELECTRIC POLARIZATION FORCE OCCURS IN A MANNER ANALOGOUS TO RADIALLY DIRECTED BUOYANCY FORCES THAT EXIST IN A STAR, A PLANETARY ATMOSPHERE, OR AN OCEAN. IN ADDITION TO RADIAL BUOYANCY FORCES, THE THERMAL FORCING ASSOCIATED WITH POLE-TO-EQUATOR TEMPERATURE GRADIENTS IS ALSO INCLUDED. THUS, BY PROPER SELECTION OF ROTATION RATES OF THE CAPACITOR, IMPOSED TEMPERATURE GRADIENTS, AND APPLIED VOLTAGES, A ONE-TO-ONE SCALING CAN BE OBTAINED BETWEEN THE EXPERIMENT AND THE SOLAR AND JOVIAN CIRCULATIONS.

----- SPACELAB 3, LAL-----

INVESTIGATION NAME- FLUID EXPERIMENT SYSTEMS (FES)

NSSDC ID- SPALAB3-01

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.B. LAL	ALABAMA A&N U
PI - R.L. KROES	NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO ASSESS THE SCIENTIFIC UNCERTAINTIES REGARDING SOLUTION AND MELT CRYSTAL GROWTH IN A LOW-GRAVITY ENVIRONMENT, OBTAIN BASIC DATA ON CRYSTAL GROWING PROCESSES, AND PRODUCE IMPROVED CRYSTALS BY REDUCING CONVECTION TRANSIENTS. THIS EXPERIMENT WILL PRODUCE BASIC DATA ON THE PHYSICAL PROCESSES ASSOCIATED WITH SOLUTION GROWTH OF CRYSTALS. SPECIFIC OBJECTIVES OF THE EXPERIMENT ARE (A) TO PRODUCE A STRUCTURALLY MORE HOMOGENEOUS CRYSTAL, FREE FROM INCLUSIONS OF SOLUTION, BY ELIMINATING CONVECTION TRANSIENTS; (B) TO OBTAIN DATA ON MASS AND HEAT TRANSPORT IN A LARGELY DIFFUSION-CONTROLLED GROWTH SYSTEM; AND (C) TO CONFIRM THE ADVANTAGES OF A LOW-GRAVITY ENVIRONMENT FOR SOLUTION CRYSTAL GROWTH. THE CRYSTAL GROWTH REGION IN THE FLUID EXPERIMENT SYSTEM IS A LIQUID-FILLED CUBIC VOLUME APPROXIMATELY 10 CM ON A SIDE. THIS VOLUME IS CONTROLLED THERMODYNAMICALLY AND IS OBSERVED VIA A HOLOGRAPHIC OPTICAL SYSTEM. THIS SYSTEM WILL BE USED TO MONITOR THE VARIATIONS IN THE LIQUID DENSITY SOLUTION CONCENTRATION AND TEMPERATURE AROUND GROWING CRYSTALS. TRIGLYCINE SULFATE (TGS) CRYSTALS WILL BE GROWN.

----- SPACELAB 3, NONE ASSIGNED-----

INVESTIGATION NAME- RESEARCH ANIMAL HOLDING FACILITY (RAHF)

NSSDC ID- SPALAB3-11

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
PLANETARY BIOLOGY

PERSONNEL

PI - NONE ASSIGNED

BRIEF DESCRIPTION

THE OBJECTIVES OF THE RESEARCH ANIMAL HOLDING FACILITIES (RAHFs) SL 3 VERIFICATION TEST ARE TO EVALUATE OPERATIONAL REQUIREMENTS AND PROCEDURES FOR THE PREFLIGHT PREPARATION, LAUNCH, IN ORBIT, DE-ORBIT, LANDING AND POSTFLIGHT HANDLING AND CARE OF SELECTED ANIMAL SPECIMENS (RAT, MOUSE AND PRIMATES); TO PROVIDE A FINAL BIOCOMPARABILITY ASSESSMENT BETWEEN ANIMALS AND THE RAHF UNDER WEIGHTLESS CONDITIONS AND CLOSED LIFE SUPPORT SYSTEMS OF THE SPACE TRANSPORT SYSTEM (STS); TO OBTAIN OPERATIONAL EXPERIENCE AS A PRECURSOR FOR MORE COMPLEX DEDICATED MISSIONS; AND TO PERFORM A STUDY OF THE PHYSIOLOGICAL, BEHAVIORAL, AND MORPHOLOGICAL CHANGES THAT MAY

OCCUR AS A CONSEQUENCE OF CONFINEMENT IN THE RAHF DURING SPACEFLIGHT. 20 RATS AND 20 MICE WILL BE FLOWN IN ONE RAHF UNIT. PRIMATES WILL BE FLOWN IN THE OTHER. OTHER THAN VISUAL AND PHOTOGRAPHIC OBSERVATION OF THE ANIMALS, NO INTERFACE WITH THE ANIMAL PAYLOAD WILL BE REQUIRED EXCEPT NORMAL HOUSEKEEPING OPERATIONS. RAHF OPERATION AND ANIMAL/RAHF INTERFACES ARE FULLY DOCUMENTED BY VISUAL MEANS, BY TAPED VERBAL COMMENTS, BY WRITTEN NOTES, AND PHOTOGRAPHICALLY USING 16 MM MOTION AND 35 MM STILL CAMERAS. AFTER RECOVERY OF ANIMALS, BEHAVIOR IS MONITORED, AND PHYSIOLOGICAL AND MORPHOLOGICAL DATA ARE OBTAINED TO COMPARE WITH IN-FLIGHT DATA AND GROUND CONTROLS.

----- SPACELAB 3, SCHNEPPLE-----

INVESTIGATION NAME- VAPOR CRYSTAL GROWTH SYSTEM (VCGS)

NSSDC ID- SPALAB3-02

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - W.F. SCHNEPPLE	EG&G INC
O1 - L. VON DEN BERG	EG&G INC
O1 - M.W. SCHIEBER	EG&G INC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO GROW LARGE SINGLE CRYSTALS OF MERCURIC IODIDE (HG12) THAT ARE RELATIVELY FREE OF MASS LOAD STRAIN DEFECTS AND PHYSICAL PROPERTY INHOMOGENEITIES. THIS EXPERIMENT PRODUCES A SINGLE CRYSTAL OF HG12 VIA THE SUBLIMATION CRYSTAL GROWTH PROCESS IN AN (EVACUATED AMPOULE APPROXIMATELY 10 CM IN DIAMETER BY 15 CM HIGH. THE HG12 SOURCE MATERIAL ON THE WALLS OF THE AMPOULE IS HEATED SUCH THAT HG12 MOLECULES ARE EVAPORATED. A PLATE AT THE BOTTOM OF THE AMPOULE WITH A HG12 SEED CRYSTAL IS HELD AT A TEMPERATURE BELOW THE SOURCE MATERIAL TEMPERATURE. THE RESULTING TEMPERATURE GRADIENT BETWEEN THE AMPOULE WALLS AND THE SEED CRYSTAL CAUSES HG12 MOLECULES TO BE TRANSPORTED TO THE SEED CRYSTAL, WHEREUPON THE MOLECULES CONDENSE INTO THE SOLID PHASE. OBSERVATIONS OF THE CRYSTAL-GROWING PROCESS ARE MADE VIA A MICROSCOPE. IF OUT-OF-CONTROL GROWTH CONDITIONS OCCUR, THE CRYSTAL TEMPERATURE IS RAISED ABOVE THE SOURCE MATERIAL TEMPERATURE TO REMOVE THE ASSOCIATED UNWANTED CRYSTAL MASS, WITH SUBSEQUENT CRYSTAL COOL-DOWN TO CONTINUE THE GROWTH PROCESS.

----- SPACELAB 3, WANG-----

INVESTIGATION NAME- DROP DYNAMICS MODULE (DDM) EXPERIMENTS

NSSDC ID- SPALAB3-0V

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - T.G. WANG	NASA-JPL
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BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PERFORM BASIC EXPERIMENTS ON THE DYNAMICS OF ROTATING AND OSCILLATING DROPS, WITH A VIEW TOWARD CONFIRMING SPECIFIC THEORETICAL PREDICTIONS AND GAINING INSIGHT AND DIRECTION RELATIVE TO THOSE DYNAMIC PROCESSES NOT CURRENTLY ACCESSIBLE BY THEORY. SPECIFICALLY, THE EXPERIMENT OBJECTIVES ARE THE STUDY OF THE EQUILIBRIUM FIGURES OF A ROTATING DROP AND THE STUDY OF THE LARGE-AMPLITUDE OSCILLATIONS OF A LIQUID DROP. THE DROP DYNAMICS EXPERIMENTS ARE CONDUCTED IN AN ACOUSTICAL CHAMBER. THE LIQUID INJECTOR INJECTS A LIQUID BETWEEN TWO PROBES THAT RETRACT WHEN A PREDETERMINED SIZE DROP IS FORMED, CAUSING THE DROP TO BE FREE-FLOATING INSIDE THE ACOUSTIC CHAMBER. THREE ACOUSTIC SOURCES GENERATE AN AUDIBLE TONE THAT IS VARIED IN FREQUENCY AND AMPLITUDE TO ROTATE AND OSCILLATE THE LIQUID DROP. A MOVIE CAMERA IS USED WITH PRISMS AND MIRROR SURFACES TO RECORD THE MOVING DROPS FROM THREE DIFFERENT ANGLES. ALSO, THE VARIOUS PARAMETERS THAT ARE VARIED, SUCH AS THE FREQUENCY, AMPLITUDE, VOLTAGE, ETC., ARE RECORDED ON FILM. IN CONJUNCTION WITH THE CAMERA RECORDING, A REDUNDANT RECORDING IS MADE ON A MAGNETIC CARTRIDGE IN THE EVENT THE CAMERA IS NOT WORKING OR RUNS OUT OF FILM. THE INSTRUMENT IS DESIGNED TO RUN BOTH AUTOMATICALLY BY PREPROGRAMMED MICROPROCESSORS THROUGH THE CONTROL PANEL, AND MANUALLY BY CONTROLS ON THE CONTROL PANEL. IF PARAMETERS DIFFER FROM THE ONES WHICH ARE IN THE SOFTWARE PROGRAM NEED TO BE INSUFATED. THESE EXPERIMENTS ARE AIMED AT EXPERIMENTAL CONFIRMATION OF THEORETICAL PREDICTIONS OF FREE OSCILLATING AND ROTATING DROPS WITH DIAMETER VARYING BETWEEN 0.6 CM TO 3.0 CM; STABLE TO WITHIN 0.06 PERCENT DURING THE EXPERIMENT.

***** SPOT*****

SPACECRAFT COMMON NAME- SPOT
ALTERNATE NAMES-

NSSDC ID- SPOT

LAUNCH DATE- 04/08/84 WEIGHT- 1750. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
FRANCE

CNES

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.3 MIN
PERIAPSIS- 815. KM ALT

INCLINATION- 98.7 DEG
APOAPSIS- 829.6 KM ALT

PERSONNEL
PM - M. COUILLAND

CNES

BRIEF DESCRIPTION

THE SPOT (SYSTEME PROBATOIRE D'OBSERVATION DE LA TERRE) SPACECRAFT IS AN EARTH OBSERVATION SATELLITE WITH A GROUND RESOLUTION BETTER THAN THAT OF THE LANDSAT SERIES OF SATELLITES. THE MAIN APPLICATIONS FOR THE IMAGES RETURNED BY THE FIRST SPOT MISSION ARE LAND-USE STUDIES, AGRICULTURE AND FORESTRY RESOURCES, MINERAL AND OIL RESOURCES, AND CARTOGRAPHY. THE THREE-AXIS STABILIZED SATELLITE OPERATES IN A CIRCULAR SUNSYNCHRONOUS NEAR-POLAR ORBIT FOR A DESIGN LIFETIME OF 2 YEARS. THE SPACECRAFT DIMENSIONS ARE 2 X 2 X 3.5 M AND 15.60 M FOR THE OVERALL LENGTH OF THE DEPLOYED SOLAR PANEL. SPOT CONSISTS OF TWO PARTS (1) THE BUS, A STANDARD MULTIPURPOSE PLATFORM, AND (2) THE PAYLOAD. THE BUS PROVIDES HOUSEKEEPING INFORMATION AND ONBOARD COMPUTER. THE PAYLOAD IS MOUNTED ON ONE OF THE SIDE PANELS OF THE BUS. IT CONSISTS OF TWO IDENTICAL HIGH-RESOLUTION VISIBLE (HRV) IMAGING INSTRUMENTS AND A PACKAGE COMPRISING TWO MAGNETIC-TAPE DATA RECORDERS AND A TELEMETRY TRANSMITTER. THE HRV IMAGING INSTRUMENT OBSERVES IN THREE SPECTRAL BANDS (IN THE VISIBLE AND NEAR INFRARED PORTIONS OF THE SPECTRUM) WITH A GROUND RESOLUTION OF 20 M, AND IN A BROADER SPECTRAL BAND (PANCHROMATIC BLACK AND WHITE) WITH A GROUND RESOLUTION OF 10 M. THE PATTERN OF SUCCESSIVE GROUND TRACKS IS REPEATED EXACTLY AT 26-DAY INTERVALS. THE SPOT INSTRUMENT PACKAGE HAS THE PROVISION FOR OFF-NADIR VIEWING WHICH SHOULD BE PARTICULARLY USEFUL FOR MONITORING LOCALIZED PHENOMENA EVOLVING ON A RELATIVELY SHORT TIMESCALE. IT ALSO GIVES THE CAPABILITY OF RECORDING, DURING SUCCESSIVE SATELLITE PASSES, OF STEREOSCOPIC PAIRS OF IMAGES OF A GIVEN AREA.

----- SPOT, CRIS-STAFF -----

INVESTIGATION NAME- HIGH RESOLUTION VISIBLE IMAGER

NSSDC ID- SPOT -01

INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - CRIS-STAFF

CNES

BRIEF DESCRIPTION

THE SPOT HIGH RESOLUTION VISIBLE (HRV) IMAGER WILL PROVIDE ACQUISITION OF HIGH-RESOLUTION DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. THE HRV EXPERIMENT IS DESIGNED TO OPERATE IN EITHER OF TWO MODES, IN THE VISIBLE AND NEAR INFRARED PORTIONS OF THE SPECTRUM: A PANCHROMATIC (BLACK AND WHITE) MODE CORRESPONDING TO OBSERVATION OVER A BROAD SPECTRAL BAND (0.51 - 0.73 MICROMETER), AND A MULTISPECTRAL (COLOR) MODE CORRESPONDING TO OBSERVATION IN THREE NARROWER SPECTRAL BANDS (0.50 - 0.59, 0.61 - 0.68, AND 0.79 - 0.89 MICROMETER). THE INSTRUMENT'S SAMPLING MESH CORRESPONDS TO A GROUND ELEMENT (PIXEL) THAT IS 10 M X 10 M IN THE FIRST CASE AND 20 M X 20 M IN THE SECOND, FOR NADIR VIEWING. THE DETECTORS ARE OF THE CCD (CHARGED-COUPLED DEVICE) TYPE. EACH ARRAY CONSISTS OF 6000 DETECTORS WITHOUT ANY MECHANICAL SCANNING. LIGHT FROM THE SCENE BEING VIEWED ENTERS THE HRV INSTRUMENT VIA A PLANE MIRROR THAT IS STEERABLE BY GROUND CONTROL. THE VIEWING AXIS CAN THUS BE ORIENTED AS REQUIRED IN THE PLANE PERPENDICULAR TO THE ORBIT. THIS OFF-NADIR VIEWING CAPABILITY COVERS A RANGE OF PLUS OR MINUS 27 DEG RELATIVE TO THE VERTICAL (IN 45 STEPS OF 0.6 DEG EACH). THIS ALLOWS THE INSTRUMENT TO IMAGE ANY POINT WITHIN A STRIP EXTENDING 475 KM TO EITHER SIDE OF THE SATELLITE GROUND TRACK. THE WIDTH OF THE SWATH ACTUALLY OBSERVED VARIES BETWEEN 60 KM FOR NADIR VIEWING AND 80 KM FOR EXTREME OFF-NADIR VIEWING. WITH THIS SPECIAL FEATURE OF OFF-NADIR VIEWING, THE TWO HRV INSTRUMENTS CAN BE POINTED TO COVER ADJACENT FIELDS IN ORDER TO OBTAIN COMPLETE EARTH COVERAGE. AMONG OTHER POSSIBILITIES INTRODUCED BY THIS FEATURE ARE INCREASED REVISIT COVERAGE AT INTERVALS RANGING FROM ONE TO SEVERAL DAYS, AND RECORDING DURING SUCCESSIVE SATELLITE PASSES, OF STEREOSCOPIC PAIRS OF IMAGES OF A GIVEN AREA. THE OBSERVATION SEQUENCE IS LOADED EVERY DAY INTO THE ONBOARD COMPUTER BY THE TOULOUSE GROUND-CONTROL STATION WHILE THE SATELLITE IS WITHIN ITS RANGE. THE OPERATION SEQUENCES FOR THE TWO HRV INSTRUMENTS ARE ENTIRELY INDEPENDENT. DATA WILL BE PROCESSED AT THE CENTRE DE RECTIFICATION DES IMAGES SPATIALES (CRIS) WHICH WILL BE OPERATED BY CNES AND THE INSTITUT GEOGRAPHIQUE NATIONAL (IGN). CRIS WILL BE RESPONSIBLE FOR ARCHIVING SPOT RAW DATA RECEIVED AT TOULOUSE AND WILL CARRY OUT IMAGE DATA PROCESSING OPERATIONS. THE PROCESSING OPERATIONS ARE BASIC RADIOMETRIC AND GEOMETRIC CORRECTIONS, INCLUDING THE RELATIVE CALIBRATION IN EACH SPECTRAL BAND FOR THE CCD ELEMENTS, THE RADIOMETRIC CORRECTION DUE TO SATELLITE MOTION AND GEOMETRIC CORRECTIONS FOR THE EARTH'S ROTATION, CURVATURE AND VIEWING ANGLE. ADDITIONAL PROCESSING INCLUDES CORRECTION FOR SUPERIMPOSING IMAGES OF A GIVEN SCENE AND FURTHER CORRECTION USING DIGITAL TERRAIN MODELS (DTMS) TO ELIMINATE PARALLAX EFFECTS.

***** ST*****

SPACECRAFT COMMON NAME- ST
ALTERNATE NAMES- LARGE SPACE TELESCOPE, SPACE TELESCOPE

NSSDC ID- LST

LAUNCH DATE- 12/15/83

WEIGHT- 9100. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 54.5 MIN
PERIAPSIS- 500. KM ALT

INCLINATION- 28.8 DEG
APOAPSIS- 500. KM ALT

PERSONNEL

RG - D.R. BURROWBRIDGE
SC - E.J. WEILER
PM - F.G. SPEER
PW - G.L. BURDETT
PS - C.R. O'DELL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-MSCF
NASA-GSFC
NASA-MSCF

BRIEF DESCRIPTION

THE SPACE TELESCOPE (ST) IS A SPACEBORNE, DIFFRACTION-LIMITED RITCHIEY-CHRETIEN TELESCOPE WITH THE FOLLOWING PARAMETERS: AN EFFECTIVE APERTURE OF 2.4 M, A SPATIAL RESOLUTION OF 0.1 ARC S, AND A WAVELENGTH COVERAGE FROM 0.1 TO 1000 MICROMETERS. THE EXPECTED LIMITING MAGNITUDE IS BETWEEN 27 AND 28. THIS IS 10 TIMES BETTER RESOLUTION AND GREATER WAVELENGTH COVERAGE THAN GROUND-BASED TELESCOPES, AND DETECTS OBJECTS THAT ARE 50 TIMES FAINTER. THE TELESCOPE IS CAPABLE OF ACCOMMODATING FIVE DIFFERENT INSTRUMENTS AT ITS FOCAL PLANE. THE SPACE SHUTTLE IS USED FOR INITIAL LAUNCH, IN-ORBIT SERVICING, AND FOR RETURN OF THE ST TO THE GROUND FOR MAINTENANCE. THE ANTICIPATED MINIMUM OPERATIONAL LIFETIME, EXCLUDING DOWNTIME FOR PERIODIC MAINTENANCE AND UPDATING, IS GREATER THAN 15 YR. THE ST SYSTEM SERVES AS A NATIONAL ASTRONOMICAL SPACE OBSERVATORY FACILITY. THE USE OF THE ONBOARD INSTRUMENTATION IS OPEN TO SCIENTISTS OF ALL COUNTRIES. ITS DESIGN IS FLEXIBLE TO ALLOW FOR THE REPLACEMENT OF SCIENTIFIC INSTRUMENTATION WHEN NECESSARY, TO INCORPORATE TECHNOLOGICAL ADVANCES, AND TO SATISFY CHANGES IN THE OBSERVATIONAL INTERESTS OF THE ASTRONOMICAL COMMUNITY. INSTRUMENTATION UPDATING, REPAIR, OR REPLACEMENT CAN BE ACCOMPLISHED EITHER BY RETURN OF THE ST TO THE GROUND, OR BY USING SUITED ASTRONAUTS FOR IN-ORBIT WORK.

----- ST, BLESS -----

INVESTIGATION NAME- HIGH-SPEED PHOTOMETER (HSP)

NSSDC ID- LST -06

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.C. BLESS
O1 - G.W. VAN CITTERS
O1 - E.L. ROBINSON
O1 - J.L. ELLIOT
O1 - A.D. CODE

U OF WISCONSIN
U OF TEXAS, AUSTIN
U OF TEXAS, AUSTIN
CORNELL U
U OF WISCONSIN

BRIEF DESCRIPTION

THE HIGH-SPEED PHOTOMETER (HSP) INVESTIGATION MAKES FAST-TIME-RESOLUTION (1 MS AND SLOWER) PHOTOMETRIC OBSERVATIONS OF RAPIDLY VARYING OBJECTS IN THE SPECTRAL RANGE 115-850 NM AND LINEAR POLARIMETRIC OBSERVATIONS FROM 210 TO 780 NM OF A WIDE VARIETY OF OBJECTS. IT ESTABLISHES AN ACCURATE LINK BETWEEN OBSERVATIONS MADE ON EXISTING VISUAL AND UV PHOTOMETRIC SYSTEMS AND THE CORRESPONDING OBSERVATIONS OF THE FAINT OBJECTS OBSERVED BY THE SPACE TELESCOPE. THE INSTRUMENT CONSISTS OF TWO IMAGE DISSECTORS: ONE SENSITIVE IN THE UV AND SOLAR BLIND, THE OTHER SENSITIVE IN THE VISIBLE AND NEAR INFRARED. A WIDE VARIETY OF BANDPASSES IS FORMED BY BROADBAND AND INTERFERENCE FILTERS ARRANGED IN STRIPS ACROSS THE DISSECTOR TUBE'S PHOTOCATHODE. SOME OF THE FILTERS ARE COATED WITH A POLARIZING MATERIAL. DIAPHRAGMS PROVIDE A CHOICE OF THREE FIELDS OF VIEW: 0.7, 1.4, AND 2.8 ARC S. THE DISSECTORS CAN BE COMMANDED TO RECEIVE PHOTOELECTRONS FROM ANY OF THE APPROXIMATELY 100 FILTER-DIAPHRAGM-POLARIZER COMBINATIONS AVAILABLE. THE TWO DETECTORS CAN BE LOCATED INSIDE OR OUTSIDE OF AN AXIAL INSTRUMENT BAY, WITH NO ADDITIONAL OPTICS REQUIRED.

----- ST, BRANDT -----

INVESTIGATION NAME- HIGH-RESOLUTION SPECTROGRAPH (HRS)

NSSDC ID- LST -02

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.C. BRANDT	NASA-GSFC
O1 - A. BOGGS, 3RD	NASA-GSFC
O1 - E.A. BEAVER	U OF CALIF, SAN DIEGO
O1 - S.R. NEAP	NASA-GSFC
O1 - J.D. HUTCHINGS	DOMINION ASTROPHYS OBS
O1 - M.A. JURA	U OF CALIF, LA
O1 - J.L. LINSKY	U OF COLORADO
O1 - S.P. MARM	NASA-GSFC
O1 - B.D. SAVAGE	U OF WISCONSIN
O1 - A.M. SMITH	NASA-GSFC
O1 - L.M. TRAFTON	U OF TEXAS, AUSTIN
O1 - R.J. WEYMAN	U OF ARIZONA

BRIEF DESCRIPTION

THIS INVESTIGATION USES AN ULTRAVIOLET SPECTROGRAPH CAPABLE OF OBTAINING HIGH-QUALITY SPECTRA AT TWO RESOLVING POWERS: 20,000 AND 120,000. THE LOWER DISPERSION IS ACHIEVED WITH FOUR GRATINGS THAT COVER THE SPECTRAL RANGE 110-320 NM SO THAT EACH GRATING IS USED ONLY NEAR ITS MAXIMUM BLAZE EFFICIENCY. THE HIGHER DISPERSION UTILIZES AN ECHELLE ARRANGEMENT. THE SENSOR IS A MULTI-CHANNEL PULSE-COUNTING DEVICE, THE DIGICON. THIS DETECTOR OPERATES FUNCTIONALLY LIKE AN IMAGE-DISSECTOR TUBE AND CAN BE USED AS AN IMAGE DISSECTOR TO PERFORM STAR CENTERING AND FIELD MAPPING OF THE ENTRANCE APERTURE, ELIMINATING THE NEED FOR A SEPARATE STAR TRACKER OR SLIT CAMERA. THERE ARE TWO DETECTORS, ONE WITH A CSTE PHOTOCATHODE AND ONE WITH CSI. THE TWO TARGET ENTRANCE APERTURES HAVE FIELDS OF VIEW OF 1.50 ARC S AND 0.350 ARC S, RESPECTIVELY. THERE ARE NO SIGNIFICANT TIME CONSTRAINTS. THE HIGH-RESOLUTION SPECTROGRAPH (HRS) OPERATES IN SUNLIGHT SO THAT IT CAN BE UTILIZED AT ALL TIMES, EXCEPT WHEN THE SOURCE IS OCCULTED BY THE EARTH OR MOON. THE HIGH DYNAMIC RANGE AND CHOICE OF DISPERSIONS MAKE IT POSSIBLE TO OBSERVE A LARGE RANGE OF STELLAR MAGNITUDES, FROM VERY BRIGHT TO MODERATELY FAINT. THE HRS BRIDGES THE GAP BETWEEN OBJECTS OBSERVED BY ROCKET-BORNE SPECTROGRAPHS, COPERNICUS, IUE, AND THE FAINT-OBJECT SPECTROGRAPH (FOS).

----- ST. HARMS-----

INVESTIGATION NAME- FAINT-OBJECT SPECTROGRAPH (FOS)

NSSDC ID- LST -03

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.J. HARMS	U OF CALIF, SAN DIEGO
O1 - F. BARTKO, JR.	MARTIN-MARIETTA AFROSP
O1 - E.A. BEAVER	U OF CALIF, SAN DIEGO
O1 - H.C. FORD	U OF CALIF, LA
O1 - B. MARGON	U OF WASHINGTON
O1 - A.F. DAVIDSEN	JOHNS HOPKINS U
O1 - E.M. BURDIDGE	U OF CALIF, SAN DIEGO
O1 - J.R. ANGEL	U OF ARIZONA

BRIEF DESCRIPTION

THE FAINT-OBJECT SPECTROGRAPH (FOS) INVESTIGATION OBTAINS SPECTRA OF ASTRONOMICAL OBJECTS AT THE FAINTEST POSSIBLE LIMITING MAGNITUDE IN ULTRAVIOLET AND VISIBLE WAVELENGTHS. THE SPECTROGRAPH COVERS A BROAD SPECTRAL RANGE AND IS INTENDED FOR SPECTROSCOPY PRIMARILY AT MODERATE SPECTRAL RESOLUTION. THE SPECTRAL PROFILES OF BROAD EMISSION AND ABSORPTION FEATURES AND CONTINUUM FLUX DISTRIBUTIONS ARE OBSERVED IN BOTH EXTENDED AND POINT SOURCES. THE FOS DESIGN IS BASED ON A FIXED-SLOT SPECTROGRAPH WITH THE CAPABILITY OF SELECTING EITHER OF TWO SPECTRAL RESOLVING POWERS (100 OR 1000) OVER THE WAVELENGTH RANGE 114-1000 NM. A NONDISPERSIVE MODE IS ALSO AVAILABLE, PROVIDING CAMERA IMAGES FOR SCIENTIFIC AND TARGET ACQUISITION PURPOSES. A POLARIZATION-ANALYZER CAPABILITY IS PROVIDED OVER THE WAVELENGTH RANGE 180-285 NM. THE FOS USES A 512-DIODE LINEAR ARRAY OF PHOTON-COUNTING DIGICONS AS DETECTORS. TO COVER THE FULL WAVELENGTH RANGE, TWO DETECTORS ARE USED. THE ULTRAVIOLET/VISIBLE SENSOR HAS A MAGNESIUM FLUORIDE FACEPLATE AND A DIALKALI PHOTOCATHODE. THE VISIBLE/NEAR-IR SENSOR HAS THE SAME WINDOW MATERIAL AND AN EXTENDED-RED TRIALKALI PHOTOCATHODE. FOR THE FAINTEST OBJECTS, INTEGRATION TIMES ARE LONG.

----- ST. JEFFERYS-----

INVESTIGATION NAME- ASTROMETRY SCIENCE

NSSDC ID- LST -09

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - M.H. JEFFERYS	U OF TEXAS, AUSTIN
O1 - G.F. BENEDICT	U OF TEXAS, AUSTIN
O1 - P.D. MERMENAY	U OF TEXAS, AUSTIN
O1 - P.J. SMELUS	U OF TEXAS, AUSTIN
O1 - B.L. DUNCAN	U OF TEXAS, AUSTIN
O1 - M.F. VAN ALSTEN	YALE U
O1 - O.G. FRANZ	LOWELL OBSERVATORY
O1 - L.W. FREDRICK	U OF VIRGINIA

BRIEF DESCRIPTION

THIS INVESTIGATION USES THE FACILITIES OF THE OPTICAL TELESCOPE ASSEMBLY, INSTEAD OF REQUIRING A SEPARATE INSTRUMENT. THE SPACE TELESCOPE (ST) FINE GUIDANCE SYSTEM (FGS) CONSISTS OF THREE IDENTICAL SENSORS DISTRIBUTED IN AN ANNULUS CENTERED ON THE OPTICAL AXIS OF THE ST. EACH SENSOR HAS ITS OWN FIELD OF VIEW (FOV). IN NORMAL OPERATIONS, TWO OF THE SENSORS ARE USED FOR FINE POINTING THE ST. THE SENSOR THAT IS NOT USED FOR TELESCOPE POINTING IS THE PRIMARY ASTROMETRIC INSTRUMENT AT THAT PARTICULAR TIME. AN FGS SENSOR CONSISTS OF A SET OF GIMBALED MIRRORS SUCH THAT ANY STAR WITHIN ITS FOV CAN BE PLACED ON AN IMAGE DISSECTOR/INTERFEROMETER COMBINATION. THE ENCODER READINGS OF THE GIMBALED MIRROR AXES SUPPLY THE OBJECT POSITION IN THE FOV; THE OUTPUT OF EACH OF THE PAIR OF INTERFEROMETERS SUPPLIES A FINE ERROR SIGNAL. EACH SENSOR CONTAINS A SET OF MOVABLE FILTERS, PLUS TEMPERATURE, VOLTAGE, AND OTHER MONITORS. THE ASTROMETRY EXPERIMENTER OBSERVES STARS IN AN APPROXIMATE MAGNITUDE RANGE OF 3-20. THE EXPERIMENT HAS THE CAPABILITY OF OBSERVING 10 17TH-MAGNITUDE OBJECTS IN 10 MIN.

----- ST. VAN DE HULST-----

INVESTIGATION NAME- FAINT-OBJECT CAMERA (FOC)

NSSDC ID- LST -08

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - M.C. VAN DE HULST	MUYGENS LAB
O1 - I.R. KING	U OF CALIF, BERKELEY
O1 - P. CRANE	EUROP SO OBS, SWITZ
O1 - R. ALBRECHT	U OF VIENNA
O1 - C. BARBIERI	U OF PADOVA
O1 - A. BOKSENBURG	U COLLEGE LONDON
O1 - M.J. DISNEY	U COLLEGE CARDIFF
O1 - T.M. KAMPERMAN	ASTRONOMICAL INST
O1 - C.D. MACKAY	U OF CAMBRIDGE
O1 - R.M. WILSON	EUROP SO OBS, SWITZ
O1 - J.M. DENARVING	CNRS-LAS

BRIEF DESCRIPTION

THE FAINT-OBJECT CAMERA (FOC) INVESTIGATION USES AN IMAGING CAMERA WITH A TWO-DIMENSIONAL PHOTON-EVENT COUNTING DETECTOR, OPERATING AT A HIGH FOCAL RATIO, WHICH FULLY EXPLOITS THE SPATIAL RESOLVING POWER OF THE ST, AND IS ABLE TO DETECT OBJECTS THAT ARE 50 TIMES FAINTER THAN THOSE OBSERVABLE WITH THE MOST POWERFUL EARTHBOUND TELESCOPE. THE FOC HAS A MINIMUM FORMAT OF 200 X 200 PIXELS. BASED ON A PIXEL SIZE OF 25 X 25 MICROMETERS, A FOCAL RATIO OF APPROXIMATELY F/96 IS REQUIRED TO EXPLOIT THE SPATIAL RESOLVING POWER OF THE ST. AT THAT FOCAL RATIO, THE PIXEL SIZE IS 0.022 X 0.022 50 ARC S AND THE FIELD OF VIEW OF A 200 X 200 PIXEL CAMERA IS 4.4 X 4.4 50 ARC S. FOR IMAGERY AND PHOTOMETRY OF VERY FAINT STARS AND EXTENDED SOURCES, CUMULATIVE EXPOSURES ARE REQUIRED TO OBTAIN A USEFUL SIGNAL-TO-NOISE RATIO. THE WAVELENGTH RANGE IS 120 TO 800 NM AND THE DYNAMIC RANGE IS FROM 21ST TO 28TH VISUAL MAGNITUDE FOR POINT SOURCES, AND FROM 15TH TO 22ND VISUAL MAGNITUDE/50 ARC S FOR EXTENDED SOURCES.

----- ST. WESTPHAL-----

INVESTIGATION NAME- WIDE-FIELD CAMERA (WFC)

NSSDC ID- LST -07

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.A. WESTPHAL	CALIF INST OF TECH
O1 - M.A. BAUM	LOWELL OBSERVATORY
O1 - D.G. CUNNIE	U OF MARYLAND
O1 - G.E. DANIELSON	CALIF INST OF TECH
O1 - B.A. SMITH	U OF ARIZONA
O1 - A.D. CODE	U OF WISCONSIN
O1 - J.E. GUNN	CALIF INST OF TECH
O1 - J. KRISTIAN	CALIF INST OF TECH
O1 - C.R. LYND	KITT PEAK NATL OBS
O1 - P.K. SEIDELMANN	US NAVAL OBSERVATORY

BRIEF DESCRIPTION

THE WIDE-FIELD CAMERA INVESTIGATION USES TWO CAMERAS OF DIFFERENT FOCAL LENGTHS HOUSED IN A SINGLE PLANETARY RADIAL BAY. ONE IS A WIDE-FIELD CAMERA AND THE OTHER IS A PLANETARY CAMERA. EACH CAMERA USES A SIMPLE OPTICAL MOSAIC TECHNIQUE IN CONJUNCTION WITH FOUR CHARGE-COUPLED DEVICES (CCD) AS DETECTORS, EACH HAVING 800 X 800 PICTURE ELEMENTS. EACH CCD IS THINNED FOR BACK-SIDE ILLUMINATION, AND THEIR SPECTRAL RESPONSES ARE EXTENDED SHORTWARD FROM THE VISIBLE TO THE VACUUM ULTRAVIOLET BY SPECIAL PROCESSING. THE OVERALL QUANTUM EFFICIENCY OF THE INSTRUMENT IS ABOUT 10 PERCENT FROM LYMAN ALPHA (121.6 NM) TO 350 NM, RISING RAPIDLY TO ABOUT 50 PERCENT FROM 450 TO 800 NM, THEN GRADUALLY DECREASING INTO THE INFRARED. THE COMBINATION OF THE OPTICAL MOSAIC AND CCD DETECTORS PROVIDES A CONTIGUOUS FIELD WITH AN OVERALL SIZE OF 1600 X 1600 PIXELS. FOCAL RATIOS OF F/12.9 AND F/30 GIVE FIELD SIZES OF 2.67 50 ARC MIN AT A RESOLUTION OF 0.1 ARC S PER PIXEL FOR THE WIDE-FIELD CAMERA AND 66.7 50 ARC S AT 0.043 ARC S PER PIXEL FOR THE PLANETARY CAMERA. THE INSTRUMENT CONTAINS

SPACE FOR 50 FILTERS, POLARIZERS/FILTERS, AND TRANSMISSION GRATINGS.

***** STP P80-1*****

SPACECRAFT COMMON NAME- STP P80-1
ALTERNATE NAMES- SPACE TEST PROGRAM P80-1, P80-1

NSSDC ID- P80-1

LAUNCH DATE- 06/00/83 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.6 MIN INCLINATION- 72.5 DEG
PERIAPSIS- 740.8 KM ALT APOAPSIS- 740.8 KM ALT

PERSONNEL
PM - J.M. JENSEN USAF SPACE DIVISION
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
SPACE TEST PROGRAM P80-1 IS A DOD SATELLITE WHICH IS ESSENTIALLY A RECTANGULAR PARALLELEPIPED OF APPROXIMATE DIMENSIONS 2.4 X 2.4 X 0.7 METERS. IT HAS A CIRCULAR ORBIT AND IS THREE-AXIS STABILIZED TO MAINTAIN ONE 2.4 X 2.4 METER SURFACE VECTOR MADIIR POINTING. THE SPACECRAFT SERVES AS A STABLE PLATFORM REFERENCE FOR THREE EXPERIMENT TELESCOPES. TELEMETRY CAPABILITY IS PCM AND USES ONBOARD STORAGE TAPE RECORDERS WITH UP TO 6 HOURS STORAGE.

----- STP P80-1, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET PHOTOMETER

NSSDC ID- P80-1 -03 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
EARTH RESOURCES SURVEY
ASTRONOMY

PERSONNEL
PI - C.S. BOWYER U OF CALIF, BERKELEY
OI - D. FINLEY U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THE EXTREME ULTRAVIOLET PHOTOMETER INVESTIGATION CONSISTS OF TWO IMAGING GRAZING-INCIDENCE TELESCOPES WITH SEVERAL BROADBAND FILTERS SENSITIVE TO EXTREME AND FAR ULTRAVIOLET RADIATION. ONE TELESCOPE IS MADIIR-LOOKING AND THE OTHER IS ZENITH-LOOKING. THE ORBITAL MOTION OF THE SPACECRAFT PROVIDES A SCANNING FUNCTION, RESULTING IN A MAPPING OF EARTH AND SKY IN THE WAVELENGTH REGIONS OF INTEREST THROUGHOUT THE MISSION.

----- STP P80-1, LARSON-----

INVESTIGATION NAME- TEAL RUBY

NSSDC ID- P80-1 -01 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - J.C. LARSON LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS INVESTIGATION USES AN INFRARED TELESCOPE AND DETECTION SYSTEM WHICH HAS A MULTISPECTRAL MOSAIC FOCAL PLANE TO MEASURE SIGNAL STRENGTH IN A VARIETY OF SPECTRAL BANDS IN THE INFRARED. IT GATHERS EARTH BACKGROUND DATA AND TESTS TECHNIQUES FOR IR DETECTION AND DATA REDUCTION.

----- STP P80-1, POWER-----

INVESTIGATION NAME- ION AUXILIARY PROPULSION SYSTEM

NSSDC ID- P80-1 -02 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.L. POWER NASA-LERC

BRIEF DESCRIPTION
THE ION AUXILIARY PROPULSION SYSTEM WILL TEST TWO MERCURY ION THRUSTERS, EACH PRODUCING ONE MILLIPOUND OF THRUST. THESE ARE CONFIGURED ON THE SPACECRAFT TO BE REPRESENTATIVE OF THRUSTER'S USE FOR STATIONKEEPING AND MANEUVERING. INSTRUMENTATION PROVIDES THRUSTER PERFORMANCE AND MEASURES THE EFFECTS OF THE THRUSTERS ON OTHER SPACECRAFT COMPONENTS AND FUNCTIONS.

***** UARS-1*****

SPACECRAFT COMMON NAME- UARS-1
ALTERNATE NAMES- UPPER ATMOSPHERIC RESEARCH SATELLITE

NSSDC ID- UARS-1

LAUNCH DATE- 10/00/80 WEIGHT- 3225. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OAST

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 97. MIN INCLINATION- 56. DEG
PERIAPSIS- 600. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL
MG - D.O. BROOME NASA HEADQUARTERS
SC - R.J. MCNEAL NASA HEADQUARTERS
PM - P.T. BURR NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
TWO UPPER-ATMOSPHERE RESEARCH SATELLITES, UARS-1 AND UARS-2, ARE PART OF THE UPPER-ATMOSPHERE RESEARCH PROGRAM. THE BASIC OBJECTIVES OF THE UARS-1 MISSION ARE TO CONDUCT RESEARCH IN THE ATMOSPHERE ABOVE THE TROPOPAUSE, AND TO MEASURE THE GLOBAL BUDGET OF CONSTITUENT TRACE GASES AND THEIR CHEMICAL, DYNAMIC, AND RADIATIVE BEHAVIOR. SPECIFICALLY, THE OBJECTIVES ARE (1) TO STUDY ENERGY INPUT AND LOSS IN THE UPPER ATMOSPHERE; (2) TO STUDY GLOBAL ATMOSPHERIC PHOTOCHEMISTRY; (3) TO STUDY DYNAMICS OF THE UPPER ATMOSPHERE; AND (4) TO STUDY THE COUPLING AMONG PROCESSES AND BETWEEN ATMOSPHERIC REGIONS. THE SECOND SPACECRAFT (UARS-2) WITH SIMILAR OBJECTIVES WILL BE LAUNCHED 1 YEAR AFTER UARS-1 INTO A SIMILAR 600-KM CIRCULAR ORBIT BUT WITH A HIGHER INCLINATION ANGLE. THE PLANNED LIFETIME FOR EACH SPACECRAFT IS 18 MONTHS, BUT THIS MAY BE EXTENDED BY RETRIEVAL OR IN-ORBIT REFURBISHMENT/RESUPPLY BY THE SHUTTLE. THE UARS HAS TWO MAJOR COMPONENTS. THE FIRST IS THE MULTIMISSIION MODULAR SPACECRAFT (MMS), DESIGNED AS A STANDARD BUS FOR NASA SPACECRAFT MISSIONS (E.G., SMM AND LANDSAT-D), AND CONSISTING OF FOUR BASIC MODULES: ATTITUDE CONTROL SUBSYSTEM; POWER SUBSYSTEM; COMMUNICATIONS AND DATA HANDLING SUBSYSTEM; AND PROPULSION MODULE. THE SECOND MAJOR COMPONENT IS AN INSTRUMENT ASSEMBLY (IA) WHICH IS COMPOSED OF (1) THE FOUR MICROWAVE ANTENNAS AND THEIR MOMENTUM-COMPENSATING DEVICES; (2) A SOLAR-POINTED INSTRUMENT PLATFORM WITH SOLAR INSTRUMENTS; (3) THE CRYOGENIC LIMB INTERFEROMETER INSTRUMENT; (4) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT DO NOT REQUIRE CRYOGENIC COOLING; AND (5) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT CONTAIN CRYOGENS. THE MMS WILL MAINTAIN A PRECISE ORIENTATION TO THE LOCAL VERTICAL AND TO THE VELOCITY VECTOR. THERE ARE THREE ON-BOARD TAPE RECORDERS. THREE NASA STANDARD 50-AMP-HOUR NICKEL-CADMIUM BATTERIES WILL FLY ALONG WITH THE SOLAR CELL ARRAY. THE DATA WILL BE RETURNED TO EARTH BY TDRSS. A CENTRAL DATA PROCESSING FACILITY WITH REMOTE PROCESSING AND DISPLAY TERMINALS AT THE INVESTIGATOR'S INSTITUTION IS PLANNED.

----- UARS-1, BRUECKNER-----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM

NSSDC ID- UARS-1 -08 INVESTIGATIVE PROGRAM
CODE ED
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL
PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - M.E. VAN HOOSIER US NAVAL RESEARCH LAB
OI - D.K. PRINZ US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THE MAIN OBJECTIVE OF THIS INVESTIGATION IS TO IMPROVE THE EXISTING ACCURACY OF SOLAR FLUX MEASUREMENTS IN THE 120- TO 400-NM REGION OF THE SPECTRUM AND TO ESTABLISH THE VARIATIONS OF THIS FLUX OVER A SOLAR CYCLE. THE FULL-SUN SPECTRAL IRRADIANCE IS MEASURED WITH TWO SPECTRAL RESOLUTIONS, 0.15 AND 5 NM, WITH AN ABSOLUTE ACCURACY OF PLUS OR MINUS 6-10 PERCENT (WAVELENGTH DEPENDENT). THE ACCURACY OF THE MEASUREMENTS BELOW 210 NM RELATIVE TO MEASUREMENTS OF THE MORE STABLE SOLAR CONTINUUM ABOVE 210 NM IS PLUS OR MINUS 1-5 PERCENT (WAVELENGTH DEPENDENT). THE SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SUSIM) CONSISTS OF TWO IDENTICAL DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AND A DEUTERIUM CALIBRATION LAMP. THE SPECTROMETERS AND DETECTORS ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON GAS. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY. THE SECOND IS USED INFREQUENTLY TO TRACK THE STABILITY OF THE FIRST. THE DEUTERIUM LAMP SERVES AS A SECONDARY STANDARD FOR IN-FLIGHT CALIBRATION.

----- UARS-1, CARLSON-----

INVESTIGATION NAME- GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING
EXPERIMENT

NSSDC ID- UARS-1 -14 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - R.W. CARLSON NASA-JPL
OI - A.L. FYRA7 NASA-JPL
OI - E.R. REITER COLORADO STATE U
OI - Y.L. YUNG CALIF INST OF TECH
OI - J.E. LOVILL LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO PRODUCE DAILY GLOBAL MAPS OF VERTICAL OZONE PROFILES IN THE 10- TO 50-KM RANGE, AT 3-KM VERTICAL RESOLUTION AND 500-MY-500-KM HORIZONTAL RESOLUTION WITH 5 PERCENT PRECISION. THE PROFILES ARE OBTAINED BY LIMB SCANS OF THE ATMOSPHERIC RADIANCE, UTILIZING ABSORPTION IN THE VISIBLE CHAPPAUS BAND AND NEAR-UV HARTLEY BAND TO DETERMINE OZONE ABUNDANCES. THE MEASUREMENTS ARE 'INVERTED' TO GIVE OZONE PROFILES IN NEAR-REAL TIME, USING A HIGH-SPEED ARRAY PROCESSOR. THE INSTRUMENT CONSISTS OF AN EIGHT-CHANNEL LIMB-SCANNING PHOTOMETER TO PROVIDE LIMB RADIANCE PROFILES AND A FOUR-CHANNEL DOWN-LOOKING GROUND/CLOUD ALBEDO SENSOR TO PROVIDE BOUNDARY CONDITIONS FOR THE DATA INVERSION. FOR THE LIMB SCAN PHOTOMETER, THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS): 3000, 3200, 5000, 5500, 6000, 6500, 7000, AND 8000; THE SPECTRAL BANDPASSES ARE 50-250 Å, DEPENDING ON CHANNEL; AND LIMB SCAN TIME IS 2.0 S. THE PROJECTED FIELD OF VIEW IS 1 KM DIAMETER. FOR THE GROUND/CLOUD ALBEDO PHOTOMETER, THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS) 3200, 5000, 6000, AND 7000. SPECTRAL BANDPASSES ARE 100 Å, AND THE SCAN TIME IS 12 S. THE PROJECTED FIELD OF VIEW IS 50-80 KM.

----- UARS-1, CHANG-----

INVESTIGATION NAME- THEORETICAL ANALYSIS-CHEMICAL,RADIATIVE,
AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE

NSSDC ID- UARS-1 -20 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - J.S. CHANG LAWRENCE LIVERMORE LAB
PI - F.M. LUTHER LAWRENCE LIVERMORE LAB
OI - W.H. DUENER LAWRENCE LIVERMORE LAB
OI - J.E. PENNER LAWRENCE LIVERMORE LAB
OI - D.J. WUEBBLES LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION
THIS INVESTIGATION STUDIES THE MECHANISMS THAT CONTROL UPPER ATMOSPHERE STRUCTURE VARIABILITY AND THE RESPONSE OF THE UPPER ATMOSPHERE TO NATURAL AND ANTHROPOGENIC PERTURBATIONS. THE FOCUS IS ON THE CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES IN THE MIDDLE ATMOSPHERE USING TIME-DEPENDENT TRANSPORT-KINETICS MODELS.

----- UARS-1, CUNNOLD-----

INVESTIGATION NAME- PREDICTION OF THE DYNAMICAL IMPACT OF
CHANGES IN STRATOSPHERIC OZONE

NSSDC ID- UARS-1 -10 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - D.M. CUNNOLD GEORGIA INST OF TECH
OI - F.N. ALVEA MASS INST OF TECH

BRIEF DESCRIPTION
THIS INVESTIGATION USES THE UARS DATA TO TEST AND UPDATE A THREE-DIMENSIONAL PHOTOCHEMICAL DYNAMICAL MODEL OF THE STRATOSPHERE. A 32-LEVEL MODEL, EXTENDING FROM THE GROUND TO 87 KM AND CONTAINING A HORIZONTAL RESOLUTION APPROXIMATELY EQUIVALENT TO PLANETARY WAVE-NUMBER 10, IS USED IN THIS STUDY. IT CONTAINS THE PREDICTION OF BETWEEN THREE AND SIX LONG-LIVED CHEMICAL SPECIES. A PRINCIPAL GOAL OF THIS MODELING ACTIVITY IS TO ESTIMATE THE DYNAMICAL RESPONSE OF THE ATMOSPHERE TO CHEMICAL PERTURBATIONS, PARTICULARLY THE NATURE OF TRANSPORT IN THE STRATOSPHERE.

----- UARS-1, GELLER-----

INVESTIGATION NAME- OBSERV,ANALYSIS-THEORETICAL MODELLING
INVESTIGATIONS OF DYNAMICS FOR UARS

NSSDC ID- UARS-1 -20 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M.A. GELLER U OF MIAMI
OI - E.J. PITCHER U OF MIAMI
OI - J.E. GEISLER U OF MIAMI

BRIEF DESCRIPTION
THE MAJOR GOALS OF THIS INVESTIGATION ARE (1) TO CONSTRUCT A SIMULATION OF UPPER-ATMOSPHERE FLOW REGIMES AND UTILIZE THE PROPOSED UARS OBSERVING PARAMETERS TO STUDY THE RESOLVABILITY OF UPPER-ATMOSPHERE DYNAMICS BY THE UARS INSTRUMENTS AND SUBSEQUENT DATA ANALYSIS; (2) TO USE PRE-UARS LIMB SCANNING DATA FOR THE STRATOSPHERE AND MESOSPHERE FOR GENERAL CIRCULATION STUDIES; (3) TO ASSESS THE EXTENT TO WHICH UPPER-ATMOSPHERE DATA MUST BE INCLUDED IN STUDIES OF TROPOSPHERIC CLIMATE AND IN EXTENDED RANGE FORECASTING; AND (4) TO PURSUE A THEORETICAL MODELING EFFORT ON STRATOSPHERIC/MESOSPHERIC DYNAMICS AND ITS RELATION TO TROPOSPHERIC DYNAMICS.

----- UARS-1, GILLE-----

INVESTIGATION NAME- ADVANCED LIMB SCANNER

NSSDC ID- UARS-1 -10 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.C. GILLE NATL CTR FOR ATMOS RES
PI - J.M. RUSSELL, SRD NASA-LARC
OI - R.J. CICERONE U OF CALIF, SAN DIEGO
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - M.A. GELLER U OF MIAMI

BRIEF DESCRIPTION
THE ADVANCED LIMB SCANNER (ALS) EXPERIMENT HAS AS ITS OBJECTIVE MEASUREMENT OF THE VERTICAL AND HORIZONTAL DISTRIBUTIONS OF IMPORTANT TRACE GASES IN THE UPPER ATMOSPHERE, INCLUDING O₃, NO₂, HNO₃, N₂O, H₂O, AND CH₄; AND TEMPERATURE MEASUREMENT IN THE 8- TO 75-KM ALTITUDE RANGE WITH A 1 DEG K RMS ERROR FOR ALTITUDE LESS THAN 50 KM. A MULTISPECTRAL INTERFERENCE FILTER RADIOMETER WITH ELEVATION SCAN AND TWO-AZIMUTH POSITION CAPABILITY IS USED AND THE MEASUREMENT TECHNIQUE INVOLVES THE INVERSION OF THE MEASURED RADIANCE PROFILES. INSTANTANEOUS VERTICAL FIELDS OF VIEW (IFOV) ARE LESS THAN 2 KM IN ALL EXCEPT TWO CHANNELS, WHICH ARE DESIGNED FOR LOW-ALTITUDE SENSING. FOR THESE CHANNELS, THE IFOV IS LESS THAN 1 KM. THE SPECTRAL RANGE OF APPROXIMATELY 6 TO 18 MICROMETERS IS COVERED WITH CHANNELS RANGING IN RESOLUTION FROM 80 TO 220 INVERSE CENTIMETERS. THE INSTRUMENT USES MERCURY-CADMIUM-TELLURIDE DETECTORS COOLED TO 80 DEG K.

----- UARS-1, GILLE-----

INVESTIGATION NAME- CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION
RADIOMETER

NSSDC ID- UARS-1 -12 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.C. GILLE NATL CTR FOR ATMOS RES
PI - W.G. HANKIN NATL CTR FOR ATMOS RES
PI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - M.T. COFFEY NATL CTR FOR ATMOS RES
OI - J.R. HOLTON U OF WASHINGTON
OI - V.G. KUNDE NASA-GSFC
OI - D.G. MURCRAY U OF DENVER
OI - J.M. RUSSELL, SRD NASA-LARC
OI - A.T. STAIR, JR. USAF GEOPHYS LAB
OI - M.A. GELLER U OF MIAMI

BRIEF DESCRIPTION
THE INVESTIGATION OBJECTIVE IS TO OBTAIN MEASUREMENTS, THE INVERSION OF WHICH PROVIDES MORE DETAILED AND COMPREHENSIVE GLOBAL MAPS OF TEMPERATURE, TRACE SPECIES, AND EMISSION FEATURES OVER THE 10- TO 120-KM RANGE. THE CRYOGENIC UPPER ATMOSPHERE LIMB EMISSION RADIOMETER (CULER) IS A CRYOGENICALLY COOLED TELESCOPE OF 15-CM APERTURE WITH A LIMB SCANNING MIRROR FEEDING A 24-CHANNEL RADIOMETER AND A CIRCULAR VARIABLE-FILTER (CVF) SPECTROMETER. THE FIXED RADIOMETRIC CHANNELS, SELECTED

BY GRATING-FILTER COMBINATIONS BETWEEN 370-7000 INVERSE CENTIMETER (1.5 TO 27 MICROMETERS), ARE TAILORED FOR SPECIFIC MEASUREMENTS; E.G., TEMPERATURE SOUNDING, CONCENTRATION OF PREDETERMINED CHEMICAL SPECIES, OR EMISSIONS FROM SPECIFIC EXCITATION MECHANISMS. THE SPECTRALLY SELECTIVE CVF HAS 1 PERCENT RESOLUTION BETWEEN 660-9000 INVERSE CENTIMETER.

----- UARS-1, GRAYSTONE-----

INVESTIGATION NAME- THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE

NSSDC ID- UARS-1 -25 INVESTIGATIVE PROGRAM CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - P. GRAYSTONE METEOROLOGICAL OFFICE

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO FURTHER THE UNDERSTANDING OF THE STRATOSPHERE AND TO STUDY ITS INTERACTIONS WITH THE TROPOSPHERE. THESE OBJECTIVES ARE ACHIEVED THROUGH TWO PRIMARY ACTIVITIES, ANALYSIS AND DIAGNOSIS. A COMPREHENSIVE THREE-DIMENSIONAL NUMERICAL MODEL OF THE TROPOSPHERE AND STRATOSPHERE IS USED.

----- UARS-1, GROSE-----

INVESTIGATION NAME- STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS

NSSDC ID- UARS-1 -22 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - W.L. GROSE NASA-LARC
OI - J.T. BLACKSHEAR NASA-LARC
OI - K.V. HAGGARD NASA-LARC
OI - E.E. REMSBERG NASA-LARC
OI - R.E. TURNER NASA-LARC
OI - R.J. KURZEJA GEORGE WASHINGTON U

BRIEF DESCRIPTION
THIS INVESTIGATION IS A COORDINATED PROGRAM OF THEORETICAL MODEL STUDIES, DATA ANALYSIS, AND INTERPRETATION DESIGNED TO STUDY TRANSPORT PROCESSES, BUDGETS OF TRACE CHEMICALS, AND ENERGETICS OF THE STRATOSPHERE. THE FIRST PART OF THIS EFFORT IS DEVOTED TO THE STUDY OF THE TRANSPORT OF MINOR CONSTITUENTS, HEAT, MOMENTUM, AND POTENTIAL VORTICITY IN THE STRATOSPHERE. THE SECOND PART UTILIZES UARS DATA TO STUDY BUDGETS OF TRACE CHEMICALS BY DETERMINING BULK MASS TRANSFER RATES WITHIN THE STRATOSPHERE AND AMONG THE STRATOSPHERE, TROPOSPHERE, AND MESOSPHERE. THE LAST PART OF THIS EFFORT IS AN ANALYSIS OF STRATOSPHERIC ENERGETICS.

----- UARS-1, HAYS-----

INVESTIGATION NAME- HIGH RESOLUTION DOPPLER IMAGER (HRDI)

NSSDC ID- UARS-1 -02 INVESTIGATIVE PROGRAM CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - P.B. HAYS U OF MICHIGAN
OI - G. HERNANDEZ NOAA-EPL
OI - D. REES U COLLEGE LONDON
OI - R.G. ROBLE NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO USE A HIGH-RESOLUTION, DOPPLER-IMAGING, FABRY-PEROT INTERFEROMETER DETECTING SHARP FEATURES IN THE SPECTRUM OF LIGHT EMITTED OR SCATTERED FROM THE EARTH'S ATMOSPHERE TO OBTAIN THE TEMPERATURE AND VECTOR WIND FIELD DIRECTLY. THE INFORMATION OBTAINED IS USED TO STUDY A SERIES OF PROBLEMS ASSOCIATED WITH THE DYNAMICS OF THE ATMOSPHERE AND THE TRANSPORT OF MINOR CONSTITUENTS WITHIN THE ATMOSPHERE. THERE IS A SINGLE SENSOR CONTAINING THE SPECTRAL FILTERS AND THE MAIN OBJECTIVE TELESCOPE WHICH CAN VIEW THE EARTH'S HORIZON THROUGH EITHER OF TWO ORTHOGONAL BAFFLE SYSTEMS. SWITCHING BETWEEN THESE BAFFLES IS ACCOMPLISHED BY ROTATING THE ZENITH SCAN MIRROR THROUGH 90 DEG. HORIZON SCANNING IS ACCOMPLISHED BY TILTING THIS MIRROR THROUGH 7.5 DEG IN THE ZENITH DIRECTION.

----- UARS-1, NEELIS-----

INVESTIGATION NAME- ION CONVECTION ELECTRODYNAMICS

NSSDC ID- UARS-1 -06 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.A. NEELIS U OF TEXAS, DALLAS
OI - W.D. HANSON U OF TEXAS, DALLAS
OI - J.H. HOFFMAN U OF TEXAS, DALLAS
OI - C.R. LIPPENCOTT U OF TEXAS, DALLAS
OI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - E.L. BREIG U OF TEXAS, DALLAS
OI - D.R. ZUCCARO U OF TEXAS, DALLAS

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE (1) TO MEASURE THE ION VELOCITY FIELD ALONG THE ORBIT TRACK, FROM WHICH THE CORRESPONDING IONOSPHERIC ELECTRIC FIELDS MAY BE DERIVED; (2) TO USE THE DERIVED ELECTRIC FIELDS, TOGETHER WITH WIND, PARTICLE FLUX, AND MAGNETIC FIELD DATA, TO CONSTRUCT MODELS OF THE HIGH-LATITUDE POTENTIAL DISTRIBUTION AND HEAT INPUT FROM BOTH PARTICLE AND JOWLE HEATING; (3) TO USE THE MODEL HEATING AND ION-NEUTRAL MOMENTUM TRANSFER AS INPUTS TO GLOBAL MODELS OF ATMOSPHERIC CHEMISTRY AND DYNAMICS; AND (4) TO USE THE DERIVED GLOBAL ELECTRIC FIELD DISTRIBUTIONS TO CONSTRUCT MODELS THAT REVEAL THE INTERPLAY BETWEEN THE SOLAR WIND, THUNDERSTORM ACTIVITY, AND IONOSPHERIC ELECTRIC FIELDS. THE ION CONVECTION ELECTRODYNAMICS (ICE) INSTRUMENT MAKES THE FOLLOWING MEASUREMENTS: (1) BULK ION VELOCITY (ALL COMPONENTS ARE MEASURED TO 5 PERCENT. THE SENSITIVITY IS 10 M/SEC FOR THE RAM COMPONENT AND 2 M/S FOR THE HORIZONTAL AND VERTICAL COMPONENTS. THE SAMPLING DISTANCES FOR THE RAM, HORIZONTAL, AND VERTICAL COMPONENTS ARE LESS THAN 8 KM, APPROXIMATELY 250 M, AND 500 M, RESPECTIVELY); (2) THE ION TEMPERATURE (MEASURED IN THE RANGE 200 TO 20,000 DEG K WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AND AT A SAMPLING DISTANCE OF LESS THAN 8 KM); (3) ION CONCENTRATIONS (MEASURED OVER THE RANGE 10 TO 1.0E+6 PER CUBIC CM WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AT A SAMPLING DISTANCE OF ABOUT 500 M); (4) ELECTRON TEMPERATURE (MEASURED OVER THE RANGE FROM 300 TO 20,000 DEG K, WITH AN ACCURACY OF PLUS OR MINUS 10 PERCENT AND AT A SAMPLING DISTANCE OF LESS THAN 60 KM).

----- UARS-1, HOLTON-----

INVESTIGATION NAME- WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE

NSSDC ID- UARS-1 -17 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.R. HOLTON U OF WASHINGTON
OI - J.R. WALLACE U OF WASHINGTON
OI - D.L. HARTMANN U OF WASHINGTON
OI - R.E. YOUNG NASA-ARC
OI - C.D. LEOVY U OF WASHINGTON

BRIEF DESCRIPTION
THIS INVESTIGATION USES A PROGRAM OF OBSERVATIONAL ANALYSIS AND NUMERICAL MODELING DESIGNED TO ELUCIDATE THE NATURE OF THE GENERAL CIRCULATION OF THE MIDDLE ATMOSPHERE, THE ROLE OF DYNAMICS IN CONTROLLING THE DISTRIBUTION AND VARIABILITY OF VARIOUS TRACE CONSTITUENTS, AND THE NATURE AND EXTENT OF DYNAMICAL INTERACTIONS BETWEEN THE LOWER AND MIDDLE ATMOSPHERES. EMPHASIS IS PLACED ON THE ROLES WHICH LARGE-SCALE WAVE MOTIONS PLAY IN MAINTAINING THE BUDGETS OF MOMENTUM, HEAT, AND TRACE CONSTITUENT CONCENTRATIONS ON A GLOBAL BASIS IN THE MIDDLE ATMOSPHERE.

----- UARS-1, HOUGHTON-----

INVESTIGATION NAME- AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)

NSSDC ID- UARS-1 -11 INVESTIGATIVE PROGRAM CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.T. HOUGHTON OXFORD U
OI - R. HUMMERMAN READING U
OI - M. HADLEY RUTHERFORD/APPLTON LAB
OI - K.W. DAVIES RUTHERFORD/APPLTON LAB
OI - G.D. PESKEIT OXFORD U
OI - C.D. RODGERS OXFORD U
OI - E.J. WILLIAMSON OXFORD U

01 - J.J. BARNETT
01 - J.G. WHITNEY
01 - C.A. BAILEY
01 - G.R. THORNTON
01 - J.S. SEELEY

OXFORD U
OXFORD U
OXFORD U
OXFORD U
READING U

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO MAKE GLOBAL MEASUREMENTS OF RADIATION FROM CO₂, H₂O, CO, NO, H₂O, AND CH₄. THESE MEASUREMENTS YIELD THE FOLLOWING: THE KINETIC TEMPERATURE, VIBRATIONAL TEMPERATURE, AND ALTITUDE DISTRIBUTION FOR CO₂; (2) THE H₂O CONCENTRATION FROM 15 TO 110 KM; (3) THE CO ALTITUDE DISTRIBUTION; (4) THE NO ALTITUDE DISTRIBUTION; (5) THE H₂O ALTITUDE DISTRIBUTION; AND (6) THE CH₄ ALTITUDE DISTRIBUTION. THESE PARAMETERS ARE OBTAINED AS A FUNCTION OF TIME AND LOCATION. THE IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER IS AN INFRARED RADIOMETER OBSERVING THERMAL EMISSION AND RESONANCE FLUORESCENCE OF SOLAR RADIATION FROM THE ATMOSPHERIC LIMB BY GAS CORRELATION SPECTROSCOPY. THE SPECTRAL RANGE COVERED IS 2.7 TO 100 MICROMETERS. THE ALTITUDE RANGE EXTENDS FROM 15 TO 140 KM, DEPENDING UPON THE PARTICULAR SPECIES MEASURED. FOR MOST CHANNELS, VERTICAL PROFILES OF TEMPERATURE (TO APPROXIMATELY 1 DEG K ACCURACY) AND COMPOSITION (TO APPROXIMATELY 10 PERCENT) CAN BE MADE WITH A VERTICAL RESOLUTION BETTER THAN 4 KM AND A HORIZONTAL RESOLUTION OF 400 KM (LIMITED BY GEOMETRY OF LIMB PATH).

----- UARS-1, LONDON-----

INVESTIGATION NAME- RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY

NSSDC ID- UARS-1 -19

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - J. LONDON

U OF COLORADO

BRIEF DESCRIPTION

THIS INVESTIGATION DEALS WITH THE NATURAL VARIABILITY OF THE THERMAL STRUCTURE AND OZONE CONCENTRATION OF THE UPPER ATMOSPHERE WITH EMPHASIS ON THEIR RESPONSE TO SIGNIFICANT SOLAR VARIABILITY. IT PROVIDES DEFINITIVE TESTS FROM ANALYSIS OF RETRIEVED DATA OF SPECIFIED MECHANISMS BY WHICH OZONE VARIATIONS ARE IN RESPONSE TO VARIATIONS IN SOLAR ACTIVITY. A TWO-FOLD APPROACH IS USED: DATA ANALYSIS AND STATISTICAL EVALUATION OF THE PERTINENT UPPER ATMOSPHERE PARAMETERS AS THEY RELATE TO VARIOUS FORMS OF SOLAR ACTIVITY; AND THEORETICAL STUDY OF THE SENSITIVITY OF REALISTIC MODELS OF THE OZONE PHOTOCHEMICAL EQUILIBRIUM SYSTEM AS RELATED TO OBSERVED AND SUGGESTED SOLAR VARIABILITY.

----- UARS-1, MILLER-----

INVESTIGATION NAME- SYNOPTIC ANALYSIS/DYNAMICAL INTERPRETA-
OF UARS METEOROLOGICAL INFORMATION

NSSDC ID- UARS-1 -16

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. MILLER
PI - R.S. QUIROZ

NOAA-NMC
NOAA-NMC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MERGE TEMPERATURE AND WIND MEASUREMENTS IN THE STRATOSPHERE AND MESOSPHERE WITH THE OPERATIONAL NATIONAL WEATHER SERVICE ANALYSES. ENERGY BUDGET TERMS ARE EVALUATED, AND HEIGHT AND TEMPERATURE FIELDS (PLANETARY WAVES) ARE ANALYZED BY FOURIER ANALYSIS. THE INTERLAYER DYNAMIC COUPLING AMONG THE TROPOSPHERE, STRATOSPHERE, AND MESOSPHERE ALSO IS STUDIED.

----- UARS-1, MOUNT-----

INVESTIGATION NAME- ULTRAVIOLET OZONE SPECTROMETER

NSSDC ID- UARS-1 -03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - G.M. MOUNT
01 - C.A. BARTH
01 - C.W. MORG
01 - D.W. RUSCH

U OF COLORADO
U OF COLORADO
U OF COLORADO
U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE THE OZONE DENSITY IN THE ALTITUDE RANGE FROM 40 TO 90 KM, BY OBSERVING THE ATTENUATION OF RAYLEIGH-SCATTERED SUNLIGHT IN THE NEAR ULTRAVIOLET AT WAVELENGTHS FROM 2400 TO 3400 Å; AND TO DETERMINE THE NITRIC OXIDE (NO) DENSITY IN THE ALTITUDE RANGE FROM 80 TO 250 KM BY OBSERVING THE SUNLIGHT FLUORESCENTLY SCATTERED IN THE NO GAMMA BANDS AT 2100 TO 2400 Å. THE FLIGHT INSTRUMENT WILL BE A 250-MM FOCAL LENGTH, OFF-AXIS, PARABOLIC TELESCOPE AND DUAL CHANNEL 1/8-M EBERT-FASTIE SPECTROGRAPH EMPLOYING TWO PHOTOMULTIPLIER TUBES OPERATING IN THE SPECTRAL RANGES 2100-3100 Å AND 2400-3400 Å AT 20-Å RESOLUTION. THE INSTRUMENT IS MOUNTED ONTO A SCAN PLATFORM, ALLOWING SCANNING OF THE EARTH'S LIMB IN 3-KM HEIGHT INCREMENTS IN A TIME PERIOD OF 12 S. OPERATING MODES INCLUDE (1) SIMULTANEOUS INTENSITY MEASUREMENTS AT TWO WAVELENGTHS SEPARATED BY APPROXIMATELY 300 Å, (ONE WHERE THE OZONE ABSORPTION IS STRONG AND ONE WHERE IT IS WEAK AS THE SCAN PLATFORM SCANS THE EARTH'S LIMB), AND (2) MEASUREMENT OF THE GAMMA BANDS IN THE RANGE 2150 TO 2450 Å AS THE INSTRUMENT IS SCANNED THROUGH THE EARTH'S LIMB.

----- UARS-1, REBER-----

INVESTIGATION NAME- ANALYTIC-EMPIRICAL MODELING OF UPPER
ATMOSPHERE PARAMETERS

NSSDC ID- UARS-1 -21

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - C.A. REBER
01 - F.T. HUANG
01 - A.E. MEDIN
01 - J.E. FREDERICK
01 - J. LONDON
01 - E. NILSENATH

NASA-GSFC
COMPUTER SCIENCES CORP
NASA-GSFC
NASA-GSFC
U OF COLORADO
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE THE ORGANIZATION, EMPIRICAL MODELING, AND GEOPHYSICAL INTERPRETATION OF THE VARIOUS DATA ACQUIRED FROM THE UARS. A SECONDARY OBJECTIVE IS THE ACQUISITION OF COMPLEMENTARY DATA FROM OTHER SOURCES (E.G., THE OPERATIONAL NOAA SATELLITES) FOR USE IN THIS ANALYSIS AND FOR USE BY THE UARS SCIENCE TEAM. A SUBSTANTIAL PART OF THE INVESTIGATION IS THE CALCULATION OF A TIME-DEPENDENT, THREE-DIMENSIONAL, ANALYTIC-EMPIRICAL MODEL USING DATA ON ATMOSPHERIC TEMPERATURE, MINOR SPECIES MIXING RATIOS, ETC. THE MODELING TECHNIQUE IS A DIRECT FOLLOWUP TO THE 'OGG MODEL' AND THE 'MASE SPECTROMETER-INCOHERENT SCATTER (MSIS) MODEL' WHICH HAVE PROVEN QUITE SUCCESSFUL FOR THERMOSPHERIC RESEARCH, AND TO THE CURRENT EMPIRICAL OZONE MODEL, ALL OF WHICH WERE DEVELOPED AND ARE AVAILABLE AT THE GODDARD SPACE FLIGHT CENTER, CODE 690, GREENBELT, MD 20771.

----- UARS-1, ROCHE-----

INVESTIGATION NAME- ALTITUDE DISTRIBUTION OF ATMOSPHERIC
MINOR SPECIES AND TEMP. IN 10-60KM RANGE

NSSDC ID- UARS-1 -05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.E. ROCHE
01 - J.B. KUMER
01 - R.D. SEARS
01 - T.C. JAMES
01 - L.R. REGILL
01 - K.D. BAKER
01 - D.G. MURCRAE
01 - A. GOLDMAN

LOCKHEED PALO ALTO
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LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
UTAH STAT. U
UTAH STATE U
U OF DENVER
U OF DENVER

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO REMOTELY MEASURE THE STRATOSPHERIC COMPOSITION (H₂O, H₂, NO, HNO₃, Cl₂, ClO, HCl, O₃, CO₂, AND CH₄) AND TEMPERATURE IN THE 10- TO 60-KM ALTITUDE RANGE. THE COMPOSITION AND TEMPERATURE ARE DETERMINED FROM MEASUREMENTS OF LIMB EMISSION SPECTRA IN THE 3.5- TO 12-MICROMETER INFRARED WAVELENGTH RANGE. THE NECESSARY HIGH SENSITIVITY, BACKGROUND FLUX DISCRIMINATION, AND SPECTRAL RESOLUTION ARE PROVIDED BY A CRYOGENICALLY COOLED SOLID ETALON SPECTROMETER USING A LINEAR DETECTOR ARRAY TO SIMULTANEOUSLY COVER THE 10- TO 60-KM RANGE WITH 2-KM RESOLUTION. THE SPECTRAL RESOLUTION IS 0.25 INVERSE CENTIMETER. THREE DAYS ARE REQUIRED TO ACHIEVE GLOBAL COVERAGE WITHIN THE 75-DEG LATITUDE FOR THE 57-DEG ORBIT.

----- UARS-1, ROTTMAN-----

INVESTIGATION NAME- ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT

NSSDC ID- UARS-1 -04 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL
PI - G.J. ROTTMAN U OF COLORADO
OI - J. LONDON U OF COLORADO

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE SOLAR SPECTRUM AT WAVELENGTHS BETWEEN 120 AND 800 NM WITH AN ABSOLUTE ACCURACY BETTER THAN 10 PERCENT. TEMPORAL VARIATIONS OF THE SOLAR RADIATION ARE FOLLOWED TO WITHIN 1-2 PERCENT DURING THESE MISSIONS. THERE IS A 1/8 M EBERT-FASTIE SPECTROMETER WITH APPROXIMATELY 0.10-NM SPECTRAL RESOLUTION ON BOARD. IT HAS THREE SEPARATE DATA CHANNELS, EACH USING A PHOTOTUBE OPTIMIZED FOR DIFFERENT, BUT OVERLAPPING, PORTIONS OF THE INSTRUMENT SPECTRAL RANGE. SOLAR DATA ARE TAKEN ON A DAILY BASIS AND ANALYZED TO ESTABLISH CORRELATIONS OF THE SPECTRAL IRRADIANCE WITH SOLAR ROTATION AND WITH SOLAR ACTIVITY (10.7-CM FLUX LEVELS, SUNSPOT NUMBER, CALCIUM FLARE AREA, SOLAR FLARES, ETC.). THE NORMAL MODE OF OPERATION INVOLVES A 4-M DUTY CYCLE PER DAY. OF THIS TOTAL TIME, 1 M IS SPENT OBSERVING THE SUN AND THE REMAINDER OF THE TIME IS SPENT IN CALIBRATION ACTIVITIES. TEN TO 15 STARS ARE CHOSEN FOR THE CALIBRATION PROGRAM.

----- UARS-1, RUSSELL, 3RD-----

INVESTIGATION NAME- HALOGEN OCCULTATION EXPERIMENT (HALOE)

NSSDC ID- UARS-1 -09 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.M. RUSSELL, 3RD NASA-LARC
OI - J. PARK COLL OF WILLIAM + MARY
OI - S.M. DRAYSON U OF MICHIGAN
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - R.J. CICERONE U OF CALIF, SAN DIEGO
OI - P.L. HANST ENVIRON PROTECT AGENCY

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE, USING SOLAR OCCULTATION TECHNIQUES, THE UPPER-ATMOSPHERIC VERTICAL CONCENTRATION PROFILES OF H₂O, O₃, HCL, HF, NO, CH₄, HNO₃, AND CO₂. PRESSURE IN THE ALTITUDE RANGE FROM 10 TO 55 KM IS MEASURED. MEASUREMENTS ARE USED TO STUDY TRACE GAS SOURCES AND SINKS AND UPPER ATMOSPHERE TRANSPORT, AND TO VALIDATE PHOTOCHEMICAL AND ATMOSPHERIC DYNAMICS MODELS. A FOUR-CHANNEL GAS FILTER CORRELATION RADIOMETER AND A FIVE-CHANNEL FILTER RADIOMETER MOUNTED ON A COMMON CHASSIS WITH AZIMUTH AND ELEVATION CAPABILITY ARE USED. THE GAS FILTER CORRELATION RADIOMETER IS USED TO MEASURE THE HCL, HF, CH₄, NO, AND CO₂, AND BROADBAND FILTER SPECTROSCOPY IS USED TO MEASURE H₂O, O₃, HNO₃, AND CO₂. THE CO₂ DATA ARE USED TO OBTAIN THE ATMOSPHERIC PRESSURE PROFILE.

----- UARS-1, THUILLIER-----

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE

NSSDC ID- UARS-1 -01 INVESTIGATIVE PROGRAM CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - G. THUILLIER CNRS-SA
OI - P. CONNES PARIS OBSERVATORY
OI - M. TEITELBAUM CNRS-SA
OI - M.L. DUBOIN CNET
OI - P. BLUM U OF BONN
OI - S.S. CHANDRA NASA-GSFC

BRIEF DESCRIPTION
THE INVESTIGATION OBJECTIVES ARE TO MEASURE SIMULTANEOUSLY THE WIND AND TEMPERATURE IN THE HIGH MESOSPHERE AND LOW THERMOSPHERE, AND TO DERIVE THE EDDY DIFFUSION COEFFICIENT USING A REMOTE SENSING METHOD. ABSOLUTE LINE INTENSITIES ARE ALSO MEASURED. THE FLIGHT INSTRUMENT IS COMPOSED OF TWO MAIN UNITS. THE UPPER PART IS A CASSEGRAIN-TYPE TELESCOPE. THE LOWER PART CONSISTS OF A FIELD-COMPENSATED MICHELSON INTERFEROMETER AND ASSOCIATED OPTICS, DETECTORS, LASER UNIT, ELECTROMECHANISMS, AND ELECTRONICS. THE WAVELENGTHS MEASURED (IN ANGSTROMS) ARE 1577,

6300, 7275, 7319, AND 7371. THE SPECTRAL SCANNING IS ACHIEVED BY A SMALL-ANGLE PRISM, CHANGING THE OPTICAL PATH OF APPROXIMATELY 1 WAVELENGTH IN 16 STEPS. THE LIND IS SCANNED IN STEPS FROM 400 TO 70 NM. THE FIELD OF VIEW IS 2 DEG IN A HORIZONTAL PLANE AND THE VERTICAL FIELD OF VIEW VARIES FROM 16 ARC MIN IN THE THERMOSPHERE, TO 4 ARC MIN FOR MESOSPHERIC OBSERVATIONS. THE DURATION OF A COMPLETE SCAN FOR A GIVEN LINE IS 1.6 S.

----- UARS-1, TORR-----

INVESTIGATION NAME- ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER

NSSDC ID- UARS-1 -15 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - D.G. TORR U OF UTAH
OI - M.R. TORR U OF UTAH
OI - T.M. DONAHUE U OF MICHIGAN
OI - A.F. NAGY U OF MICHIGAN
OI - E.R. YOUNG U OF MICHIGAN
OI - S.C. LIU NOAA
OI - R.J. CICERONE U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO MAKE HIGH-RESOLUTION STUDIES OF TRACE CONSTITUENTS IN THE MIDDLE ATMOSPHERE. THE CONSTITUENTS ARE OBSERVED THROUGH ABSORPTION OF RAYLEIGH-SCATTERED SUNLIGHT, RESONANCE FLUORESCENCE OF SUNLIGHT AT ULTRAVIOLET WAVELENGTHS, CHEMILUMINESCENCE, AND PARTICLE IMPACT EXCITATION. THE INVESTIGATION ALSO MONITORS PARTICLE PRECIPITATION FROM THE EMISSIONS AT 3914 AND 4278A. AN ECHELLE-GRATING SPECTROGRAPH MEASURES THE CONCENTRATIONS OF THE TRACE CONSTITUENTS, O₃, ON, CLO, NO, AND NO₂ AT STRATOSPHERIC AND MESOSPHERIC ALTITUDES. A HIGH-RESOLUTION (0.04A) ATLAS WILL BE COMPILED IN BOTH ABSORPTION AND EMISSION. THE WAVELENGTH RANGE IS 2000 TO 4600A. THE IMAGING CAPABILITY PERMITS A 50-KM ALTITUDE PROFILE (E.G., 20 TO 70 KM) TO BE OBSERVED SIMULTANEOUSLY AT 5-KM RESOLUTION.

----- UARS-1, WATERS-----

INVESTIGATION NAME- MICROWAVE LIND SOUNDER (MLS)

NSSDC ID- UARS-1 -13 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.W. WATERS NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE WIND, O₃, CLO, H₂O₂, TEMPERATURE, O₂, CO, H₂O, MAGNETIC FIELD, AND PRESSURE IN THE UPPER ATMOSPHERE. THE SPECTRAL REGION COVERED IS FROM 63 TO 231 GHZ. THE SAMPLED ALTITUDE RANGE EXTENDS FROM 15 TO 110 KM. THE INSTRUMENT HAS A 2-5 INTEGRATION TIME WITH LONGER INTEGRATIONS PERFORMED AS APPROPRIATE DURING DATA REDUCTION. ABSOLUTE ACCURACY OF THIS MICROWAVE LIND SOUNDER (MLS) IS APPROXIMATELY 5 PERCENT FOR COMPOSITION, APPROXIMATELY 2 DEG K FOR TEMPERATURE, AND APPROXIMATELY 3 M/S FOR WINDS. VERTICAL RESOLUTION FOR PROFILE MEASUREMENTS IS 3-6 KM; HORIZONTAL RESOLUTION IS 30 KM ACROSS AND 300 KM ALONG THE OBSERVATION DIRECTION. COMPLETE PROFILES ARE OBTAINED IN LESS THAN 50 S.

----- UARS-1, WINNINGHAM-----

INVESTIGATION NAME- PARTICLE ENVIRONMENT MONITOR (PEM)

NSSDC ID- UARS-1 -07 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - J.D. WINNINGHAM SOUTHWEST RES INST
OI - P.W. BANKS STANFORD U
OI - J.L. BURCH SOUTHWEST RES INST
OI - R.G. GUNTON LOCKHEED PALO ALTO
OI - U.L. IMHOFF LOCKHEED PALO ALTO
OI - J.B. REAGAN LOCKHEED PALO ALTO
OI - M.H. REES U OF ALASKA
OI - G.C. REID NOAA
OI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE GLOBAL INPUT OF CHARGED-PARTICLE ENERGY INTO THE EARTH'S STRATOSPHERE, MESOSPHERE, AND THERMOSPHERE AND THE PREDICTED ATMOSPHERIC PROCESSES. DIRECT IN SITU MEASUREMENTS OF PRECIPITATION ELECTRONS IN THE ENERGY RANGE FROM 100 EV TO 5 KEV AND OF PROTONS IN THE ENERGY RANGE FROM 0.5 TO 200 KEV (WITH OPTION OF EXTENDING PROTON MEASUREMENTS DOWN TO 100 EV) ARE MADE WITH A MEDIUM-ENERGY PARTICLE SPECTROMETER (MEPS) AND A HIGH-ENERGY PARTICLE SPECTROMETER (HIPS). IN ADDITION, GLOBAL IMAGES AND ENERGY SPECTRA OF ATMOSPHERIC X RAYS PRODUCED BY ELECTRON PRECIPITATION ARE PERFORMED OVER THE ENERGY RANGE FROM 6 TO 150 KEV WITH AN ATMOSPHERIC X-RAY IMAGING SPECTROMETER. THE DATA FROM THESE INSTRUMENTS ARE USED AS INPUT TO COMPUTATIONAL MODELS.

----- UARS-1, ZUREK -----

INVESTIGATION NAME- RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE

NSDC ID- UARS-1 -23 INVESTIGATIVE PROGRAM CODE 80

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - R.W. ZUREK NASA-JPL

BRIEF DESCRIPTION

THE OVERALL OBJECTIVE OF THIS INVESTIGATION IS TO CONSTRUCT A COMPREHENSIVE AND CONSISTENT CLIMATOLOGY OF THE MESOSPHERE AS OBSERVED BY THE UARS SATELLITES. FROM THE MESOSPHERIC DATA, THIS ANALYSIS PRODUCES (1) THE RADIATIVE BUDGET BASED ON O3 AND O2 ABSORPTION OF SOLAR RADIANCE AND CO2 EMISSION, INCLUDING THE EFFECTS ON THE LATTER OF NON-THERMODYNAMIC EQUILIBRIUMS AND (2) THE DYNAMICAL CLIMATOLOGY OF THE MESOSPHERE, SHOWING THE RELATIVE CONTRIBUTIONS TO THE HEAT AND MOMENTUM BUDGETS BY ADIABATIC HEATING, BY THE MEAN MERIDIONAL CIRCULATION, AND BY EDDIES (WAVES). THE EDDY CONTRIBUTION IS SEPARATED INTO STANDING AND TRANSIENT COMPONENTS WHICH INCLUDE DYNAMICAL FLUXES DUE TO ATMOSPHERIC TIDES.

***** UARS-2 *****

SPACECRAFT COMMON NAME- UARS-2
ALTERNATE NAMES- UPPER ATMOSPHERIC RESEARCH SATELLITE

NSDC ID UARS-2

LAUNCH DATE- 10/09/89 WEIGHT- 3225. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 97. MIN INCLINATION- 78. DEG
PERIAPSIS- 680. KM ALT APOAPSIS- 680. KM ALT

PERSONNEL

MG - G.B. BROOME NASA HEADQUARTERS
SC - R.J. MCNEAL NASA HEADQUARTERS
PM - P.T. BURR NASA-GSFC
PS - R.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

TWO UPPER-ATMOSPHERE RESEARCH SATELLITES, UARS-1 AND UARS-2, WILL BE LAUNCHED AS PART OF THE UPPER ATMOSPHERE RESEARCH PROGRAM. THE BASIC OBJECTIVES OF THE UARS-2 MISSION ARE TO CONDUCT RESEARCH IN THE ATMOSPHERE ABOVE THE TROPOPAUSE, AND TO MEASURE THE GLOBAL BUDGET OF CONSTITUENT TRACE GASES AND THEIR CHEMICAL, DYNAMICAL, AND RADIATIVE BEHAVIOR. SPECIFICALLY, THE OBJECTIVES ARE TO (1) TO STUDY ENERGY INPUT AND LOSS IN THE UPPER ATMOSPHERE; (2) TO STUDY GLOBAL ATMOSPHERIC PHOTOCHEMISTRY; (3) TO STUDY UPPER-ATMOSPHERE DYNAMICS; AND (4) TO STUDY THE COUPLING AMONG PROCESSES AND BETWEEN ATMOSPHERIC REGIONS. UARS-2 WILL BE LAUNCHED 1 YEAR AFTER UARS-1 INTO A SIMILAR 680-KM CIRCULAR ORBIT, BUT WITH A HIGHER INCLINATION ANGLE. THE PLANNED LIFETIME FOR EACH SPACECRAFT IS 18 MONTHS, BUT THIS MAY BE EXTENDED BY RETRIEVAL OR IN-ORBIT REFURBISHMENT/RESUPPLY BY THE SHUTTLE. THE UARS HAS TWO MAJOR COMPONENTS. THE FIRST IS THE MULTIMISSIION MODULAR SPACECRAFT (MMS), DESIGNED AS A STANDARD BUS FOR THE NASA SPACECRAFT MISSIONS (E.G., SMM AND LMDSAT-B), AND CONSISTING OF FOUR BASIC MODULES: ATTITUDE CONTROL SUBSYSTEM; POWER SUBSYSTEM; COMMUNICATIONS AND DATA HANDLING SUBSYSTEM; AND PROPULSION MODULE. THE SECOND MAJOR COMPONENT IS AN INSTRUMENT ASSEMBLY (IA) WHICH IS COMPOSED OF THE FOLLOWING INSTRUMENT MODULES: (1) THE FOUR MICROWAVE ANTENNAS AND THEIR MOMENTUM-COMPENSATING DEVICES; (2) A SOLAR-POINTED INSTRUMENT PLATFORM WITH SOLAR INSTRUMENTS; (3) THE CRYOGENIC LIND INTERFEROMETER INSTRUMENT; (4) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT DO NOT REQUIRE CRYOGENIC COOLING; AND (5) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT DO CONTAIN CRYOGENS. THE MMS MAINTAINS A PRECISE ORIENTATION TO THE LOCAL VERTICAL AND TO THE VELOCITY VECTOR. THERE ARE THREE ON-BOARD

TAPE RECORDERS. THREE NASA STANDARD 30-AMP-H NICKEL-CADMIUM BATTERIES ARE FLOWN ALONG WITH THE SOLAR-CELL ARRAY. THE DATA ARE RETURNED TO EARTH BY TDRSS. A CENTRAL DATA-PROCESSING FACILITY WITH REMOTE PROCESSING AND DISPLAY TERMINALS AT THE INVESTIGATORS' INSTITUTION IS PLANNED.

----- UARS-2, BRUECKNER -----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM

NSDC ID- UARS-2 -08 INVESTIGATIVE PROGRAM CODE 80

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - W.E. VAN HOOSIER US NAVAL RESEARCH LAB
OI - D.K. PRINZ US NAVAL RESEARCH LAB
OI - J.D.P. BARTON US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE MAIN OBJECTIVE OF THIS INVESTIGATION IS TO IMPROVE THE EXISTING ACCURACY OF SOLAR FLUX MEASUREMENTS IN THE 120- TO 400-NM REGION OF THE SPECTRUM AND TO ESTABLISH THE VARIATIONS OF THIS FLUX OVER A SOLAR CYCLE. THE FULL-SUN SPECTRAL IRRADIANCE IS MEASURED WITH TWO SPECTRAL RESOLUTIONS, 0.15 AND 5 NM, WITH AN ABSOLUTE ACCURACY OF PLUS OR MINUS 6-10 PERCENT (WAVELENGTH DEPENDENT). THE ACCURACY OF THE MEASUREMENTS BELOW 210 NM RELATIVE TO MEASUREMENTS OF THE MORE STABLE SOLAR CONTINUUM ABOVE 210 NM IS PLUS OR MINUS 1-5 PERCENT (WAVELENGTH DEPENDENT). THE SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SUSIM) CONSISTS OF TWO IDENTICAL DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AND A DEUTERIUM CALIBRATION LAMP. THE SPECTROMETERS AND DETECTORS ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON GAS. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY; THE SECOND IS USED INFREQUENTLY TO TRACK THE STABILITY OF THE FIRST. THE DEUTERIUM LAMP SERVES AS A SECONDARY STANDARD FOR IN-FLIGHT CALIBRATION.

----- UARS-2, CARLSON -----

INVESTIGATION NAME- GLIM GLOBAL LIND PHOTOMETRIC SCANNING EXPERIMENT

NSDC ID- UARS-2 -14 INVESTIGATIVE PROGRAM CODE 80

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - R.W. CARLSON NASA-JPL
OI - A.L. FYNAT NASA-JPL
OI - E.R. REITER COLORADO STATE U
OI - T.L. YUNG CALIF INST OF TECH
OI - J.E. LOVILL LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO PRODUCE DAILY GLOBAL MAPS OF VERTICAL OZONE PROFILES IN THE 10- TO 50-KM RANGE, AT 5-KM VERTICAL RESOLUTION AND 500- BY 500-KM HORIZONTAL RESOLUTION WITH 5-PERCENT PRECISION. THE PROFILES ARE OBTAINED BY LIND SCANS OF THE ATMOSPHERIC RADIANCE, UTILIZING ABSORPTION IN THE VISIBLE CHAPPUIS BAND AND NEAR-UV WARTLEY BAND TO DETERMINE OZONE ABUNDANCES. THE MEASUREMENTS ARE 'INVERTED' TO GIVE OZONE PROFILES IN NEAR-REAL TIME USING A HIGH-SPEED ARRAY PROCESSOR. THE INSTRUMENT CONSISTS OF AN EIGHT-CHANNEL LIND SCANNING PHOTOMETER TO PROVIDE LIND RADIANCE PROFILES AND A FOUR-CHANNEL DOWN-LOOKING GROUND/CLOUD ALBEDO SENSOR TO PROVIDE BOUNDARY CONDITIONS FOR THE DATA INVERSION. FOR THE LIND SCAN PHOTOMETER, THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS): 3000, 3200, 3500, 3500, 6000, 6500, 7000, AND 8000; THE SPECTRAL BANDPASSES ARE 50-250 A, DEPENDING ON CHANNEL; AND LIND SCAN TIME IS 2.0 S. THE PROJECTED FIELD OF VIEW IS 1 KM IN DIAMETER. FOR THE GROUND/CLOUD ALBEDO PHOTOMETER, THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS) 3200, 5000, 6000, AND 7000. SPECTRAL BANDPASSES ARE 100 A, AND THE SCAN TIME IS 12 S. THE PROJECTED FIELD OF VIEW IS 50-80 KM.

----- UARS-2, CHANG -----

INVESTIGATION NAME- THEORETICAL ANALYSIS-CHEMICAL-RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE

NSDC ID- UARS-2 -24 INVESTIGATIVE PROGRAM CODE 80

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
 PI - J.S. CHANG LAURENCE LIVERMORE LAB
 PI - F.M. LUTHER LAURENCE LIVERMORE LAB
 OI - M.H. DUEBER LAURENCE LIVERMORE LAB
 OI - J.E. PENNER LAURENCE LIVERMORE LAB
 OI - D.J. WUEDDLES LAURENCE LIVERMORE LAB

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIES THE MECHANISMS THAT CONTROL UPPER ATMOSPHERE STRUCTURE VARIABILITY AND THE RESPONSE OF THE UPPER ATMOSPHERE TO NATURAL AND ANTHROPOGENIC PERTURBATIONS. THE FOCUS IS ON THE CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES IN THE MIDDLE ATMOSPHERE USING TIME-DEPENDENT TRANSPORT-KINETICS MODELS.

----- UARS-2, CUNNOLD -----

INVESTIGATION NAME- PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE

NSSDC ID- UARS-2 -18

INVESTIGATIVE PROGRAM
CODE 1T

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - D.W. CUNNOLD MASS INST OF TECH
 OI - F.W. ALTZA MASS INST OF TECH

BRIEF DESCRIPTION

THIS INVESTIGATION USES THE UARS DATA TO TEST AND UPDATE A THREE-DIMENSIONAL PHOTOCHEMICAL DYNAMICAL MODEL OF THE STRATOSPHERE. A 32-LEVEL MODEL EXTENDING FROM THE GROUND TO 87 KM AND CONTAINING A HORIZONTAL RESOLUTION APPROXIMATELY EQUIVALENT TO PLANETARY WAVE-NUMBER 10 IS USED IN THIS STUDY. IT CONTAINS THE PREDICTION OF BETWEEN THREE AND SIX LONG-LIVED CHEMICAL SPECIES. A PRINCIPAL GOAL OF THIS MODELING ACTIVITY IS TO ESTIMATE THE DYNAMICAL RESPONSE OF THE ATMOSPHERE TO CHEMICAL PERTURBATIONS, PARTICULARLY THE NATURE OF TRANSPORT IN THE STRATOSPHERE.

----- UARS-2, GELLER -----

INVESTIGATION NAME- OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS

NSSDC ID- UARS-2 -20

INVESTIGATIVE PROGRAM
CODE 1B

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - M.A. GELLER U OF MIAMI
 OI - E.J. PITCHER U OF MIAMI
 OI - J.E. GEISLER U OF MIAMI

BRIEF DESCRIPTION

THE MAJOR GOALS OF THIS INVESTIGATION ARE (1) TO CONSTRUCT A SIMULATION OF UPPER-ATMOSPHERE FLOW REGIMES AND UTILIZE THE PROPOSED UARS OBSERVING PARAMETERS TO STUDY THE RESOLVABILITY OF UPPER-ATMOSPHERE DYNAMICS BY THE UARS INSTRUMENTS AND SUBSEQUENT DATA ANALYSIS; (2) TO USE PRE-UARS LIMS-SCANNING DATA FOR THE STRATOSPHERE AND MESOSPHERE FOR GENERAL CIRCULATION STUDIES; (3) TO ASSESS THE EXTENT TO WHICH UPPER-ATMOSPHERE DATA MUST BE INCLUDED IN STUDIES OF TROPOSPHERIC CLIMATE AND IN EXTENDED RANGE FORECASTING; AND (4) TO PURSUE A THEORETICAL MODELING EFFORT ON TROPOSPHERIC/MESOSPHERIC DYNAMICS AND ITS RELATION TO TROPOSPHERIC DYNAMICS.

----- UARS-2, GILLE -----

INVESTIGATION NAME- ADVANCED LIMS SCANNER

NSSDC ID- UARS-2 -10

INVESTIGATIVE PROGRAM
CODE 1B

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.C. GILLE NATL CTR FOR ATMOS RES
 PI - J.M. RUSSELL, 3RD NASA-LARC
 OI - R.J. CICERONE U OF CALIF, SAN DIEGO
 OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
 OI - M.A. GELLER U OF MIAMI

BRIEF DESCRIPTION

THE ADVANCED LIMS SCANNER (ALS) EXPERIMENT HAS AS ITS OBJECTIVE MEASUREMENT OF THE VERTICAL AND HORIZONTAL DISTRIBUTIONS OF IMPORTANT TRACE GASES IN THE UPPER ATMOSPHERE, INCLUDING O₃, NO₂, HNO₃, N₂O, N₂O₅, AND CH₄; AND TEMPERATURE MEASUREMENT IN THE 6- TO 75-KM ALTITUDE RANGE WITH A 1 DEG K RMS ERROR FOR ALTITUDE LESS THAN 50 KM. A MULTISPECTRAL INTERFERENCE FILTER RADIOMETER WITH ELEVATION SCAN AND TWO-AZIMUTH POSITION CAPABILITY IS USED AND THE MEASUREMENT

TECHNIQUE INVOLVES THE INVERSION OF THE MEASURED RADIANCE PROFILES. INSTANTANEOUS VERTICAL FIELDS OF VIEW (FOV) ARE LESS THAN 2 KM IN ALL EXCEPT TWO CHANNELS, WHICH ARE DESIGNED FOR LOW-ALTITUDE SENSING. FOR THESE CHANNELS, THE FOV IS LESS THAN 1 KM. THE SPECTRAL RANGE OF APPROXIMATELY 6 TO 10 MICROMETERS IS COVERED WITH CHANNELS RANGING IN RESOLUTION FROM 80 TO 220 INVERSE CENTIMETER. THE INSTRUMENT USES MERCURY-CADMIUM-TELLURIDE DETECTORS COOLED TO 80 DEG K.

----- UARS-2, GILLE -----

INVESTIGATION NAME- CRYOGENIC UPPER-ATMOSPHERE LIMS EMISSION RADIOMETER

NSSDC ID- UARS-2 -12

INVESTIGATIVE PROGRAM
CODE 1B

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.C. GILLE NATL CTR FOR ATMOS RES
 PI - M.G. MANKIN NATL CTR FOR ATMOS RES
 PI - R.G. RODE NATL CTR FOR ATMOS RES
 OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
 OI - M.T. COFFEY NATL CTR FOR ATMOS RES
 OI - J.R. HOLTON U OF WASHINGTON
 OI - V.G. KUNDE NASA-GSFC
 OI - D.G. MURRAY U OF DENVER
 OI - B.M. RUSSELL, 3RD NASA-LARC
 OI - A.T. STAIR, JR. USAF GEOPHYS LAB
 OI - M.A. GELLER U OF MIAMI

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO OBTAIN MEASUREMENTS, THE INVERSION OF WHICH PROVIDES MORE DETAILED AND COMPREHENSIVE GLOBAL MAPS OF TEMPERATURE, TRACE SPECIES, AND EMISSION FEATURES OVER THE 10- TO 120-KM RANGE. THE CRYOGENIC UPPER ATMOSPHERE LIMS EMISSION RADIOMETER (CULER) IS A CRYOGENICALLY-COOLED TELESCOPE OF 19-CM APERTURE WITH A LIMS SCANNING MIRROR FEEDING A 24-CHANNEL RADIOMETER AND A CIRCULAR VARIABLE FILTER (CVF) SPECTROMETER. THE FIRED RADIOMETRIC CHANNELS, SELECTED BY GRATING-FILTER COMBINATIONS BETWEEN 370-7000 INVERSE CENTIMETER (1.9 TO 27 MICROMETERS), ARE TAILORED FOR SPECIFIC MEASUREMENTS: E.G., TEMPERATURE SOUNDING, CONCENTRATION OF PREDETERMINED CHEMICAL SPECIES, OR EMISSIONS FROM SPECIFIC EXCITATION MECHANISMS. THE SPECTRALLY SELECTIVE CVF HAS 1 PERCENT RESOLUTION BETWEEN 660-9000 INVERSE CENTIMETER.

----- UARS-2, GRAYSTONE -----

INVESTIGATION NAME- THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE

NSSDC ID- UARS-2 -25

INVESTIGATIVE PROGRAM
CODE 1B/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - P. GRAYSTONE METEOROLOGICAL OFFICE

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO FURTHER THE UNDERSTANDING OF THE STRATOSPHERE AND TO STUDY ITS INTERACTIONS WITH THE TROPOSPHERE. THESE OBJECTIVES ARE ACHIEVED THROUGH TWO PRIMARY ACTIVITIES, ANALYSIS AND DIAGNOSIS. A COMPREHENSIVE THREE-DIMENSIONAL NUMERICAL MODEL OF THE TROPOSPHERE AND STRATOSPHERE IS USED.

----- UARS-2, GROSE -----

INVESTIGATION NAME- STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS

NSSDC ID- UARS-2 -22

INVESTIGATIVE PROGRAM
CODE 1B

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - M.L. GROSE NASA-LARC
 OI - M.T. BLACKSHEAR NASA-LARC
 OI - E.V. HAGGARD NASA-LARC
 OI - E.E. RENSBERG NASA-LARC
 OI - R.E. TURNER NASA-LARC
 OI - R.J. KURZBA SP-2000 WASHINGTON U

BRIEF DESCRIPTION

THIS INVESTIGATION IS A COORDINATED PROGRAM OF THEORETICAL MODEL STUDIES, DATA ANALYSIS, AND INTERPRETATION DESIGNED TO STUDY TRANSPORT PROCESSES, BUDGETS OF TRACE CHEMICALS, AND ENERGETICS OF THE STRATOSPHERE. THE FIRST PART OF THIS EFFORT IS DEVOTED TO THE STUDY OF THE TRANSPORT OF MINOR CONSTITUENTS, HEAT, MOMENTUM, AND POTENTIAL VORTICITY IN THE STRATOSPHERE. THE SECOND PART UTILIZES WARS DATA TO STUDY BUDGETS OF TRACE CHEMICALS BY DETERMINING BULK MASS TRANSFER RATES WITHIN THE STRATOSPHERE AND AROUND THE STRATOSPHERE, TROPOSPHERE, AND MESOSPHERE. THE LAST PART OF THIS EFFORT IS AN ANALYSIS OF STRATOSPHERIC ENERGETICS.

----- WARS-2, HAYS-----

INVESTIGATION NAME- HIGH RESOLUTION DOPPLER IMAGER (HARDI)

NSSDC ID- WARS-2 -02

INVESTIGATIVE PROGRAM
CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - P.D. HAYS	U OF MICHIGAN
O1 - G. HERNANDEZ	NOAA-ERL
O1 - D. RIES	U COLLEGE LONDON
O1 - R.G. ROBLE	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO USE A HIGH-RESOLUTION, DOPPLER-IMAGING, FABRY-PEROT INTERFEROMETER DETECTING SHARP FEATURES IN THE SPECTRUM OF LIGHT EMITTED OR SCATTERED FROM THE EARTH'S ATMOSPHERE TO OBTAIN THE TEMPERATURE AND VECTOR WIND FIELD DIRECTLY. THE INFORMATION OBTAINED IS USED TO STUDY A SERIES OF PROBLEMS ASSOCIATED WITH THE DYNAMICS OF THE ATMOSPHERE AND THE TRANSPORT OF MINOR CONSTITUENTS WITHIN THE ATMOSPHERE. THERE IS A SINGLE SENSOR CONTAINING THE SPECTRAL FILTERS AND THE MAIN OBJECTIVE TELESCOPE WHICH CAN VIEW THE EARTH'S HORIZON THROUGH EITHER OF TWO ORTHOGONAL BAFFLE SYSTEMS. SWITCHING BETWEEN THESE BAFFLES IS ACCOMPLISHED BY ROTATING THE ZENITH SCAN MIRROR THROUGH 90 DEG. HORIZON SCANNING IS ACCOMPLISHED BY TILTING THIS MIRROR THROUGH 7.5 DEG IN THE ZENITH DIRECTION.

----- WARS-2, HEELIS-----

INVESTIGATION NAME- ION CONVECTION ELECTRODYNAMICS

NSSDC ID- WARS-2 -06

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.A. HEELIS	U OF TEXAS, DALLAS
O1 - W.B. HANSON	U OF TEXAS, DALLAS
O1 - J.M. HOFFMAN	U OF TEXAS, DALLAS
O1 - C.R. LIPPENCOTT	U OF TEXAS, DALLAS
O1 - R.G. ROBLE	NATL CTR FOR ATMOS RES
O1 - E.L. BREIG	U OF TEXAS, DALLAS
O1 - D.R. ZUCCARO	U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE AS FOLLOWS: (1) TO MEASURE THE ION VELOCITY FIELD ALONG THE ORBIT TRACK, FROM WHICH THE CORRESPONDING IONOSPHERIC ELECTRIC FIELDS MAY BE DERIVED; (2) TO USE THE DERIVED ELECTRIC FIELDS, TOGETHER WITH WIND, PARTICLE FLUX, AND MAGNETIC FIELD DATA, TO CONSTRUCT MODELS OF THE HIGH-LATITUDE POTENTIAL DISTRIBUTION AND HEAT INPUT FROM BOTH PARTICLE AND JOULE HEATING; (3) TO USE THE MODEL HEATING AND ION-NEUTRAL MOMENTUM TRANSFER AS INPUTS TO GLOBAL MODELS OF ATMOSPHERIC CHEMISTRY AND DYNAMICS; AND (4) TO USE THE DERIVED GLOBAL ELECTRIC-FIELD DISTRIBUTIONS TO CONSTRUCT MODELS THAT WILL REVEAL THE INTERPLAY BETWEEN THE SOLAR WIND, THUNDERSTORM ACTIVITY, AND IONOSPHERIC ELECTRIC FIELDS. THE ION CONVECTION ELECTRODYNAMICS (ICE) INSTRUMENT MAKES THE FOLLOWING MEASUREMENTS: (1) BULK ION VELOCITY (ALL COMPONENTS ARE MEASURED TO 5 PERCENT. THE SENSITIVITY IS 10 M/SEC FOR THE RAM COMPONENT AND 2 M/S FOR THE HORIZONTAL AND VERTICAL COMPONENTS. THE SAMPLING DISTANCES FOR THE RAM, HORIZONTAL, AND VERTICAL COMPONENTS ARE LESS THAN 8 KM, APPROXIMATELY 250 M, AND 500 M, RESPECTIVELY); (2) THE ION TEMPERATURE (MEASURED IN THE RANGE 200 TO 20,000 DEG K WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AND AT A SAMPLING DISTANCE OF LESS THAN 8 KM); (3) ION CONCENTRATIONS (MEASURED OVER THE RANGE 10 TO 1.0E+6 PER CM^3 CM WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AT A SAMPLING DISTANCE OF ABOUT 500 M); (4) ELECTRON TEMPERATURE (MEASURED OVER THE RANGE FROM 300 TO 20,000 DEG K, WITH AN ACCURACY OF PLUS OR MINUS 10 PERCENT AND AT A SAMPLING DISTANCE OF LESS THAN 60 KM).

----- WARS-2, HOLTON-----

INVESTIGATION NAME- WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE

NSSDC ID- WARS-2 -17

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.R. HOLTON	U OF WASHINGTON
O1 - J.M. WALLACE	U OF WASHINGTON
O1 - D.L. HARTMANN	U OF WASHINGTON
O1 - R.E. YOUNG	NASA-ARC
O1 - C.B. LEEVY	U OF WASHINGTON

BRIEF DESCRIPTION

THIS INVESTIGATION USES A PROGRAM OF OBSERVATIONAL ANALYSIS AND NUMERICAL MODELING DESIGNED TO ELUCIDATE THE NATURE OF THE GENERAL CIRCULATION OF THE MIDDLE ATMOSPHERE, THE ROLE OF DYNAMICS IN CONTROLLING THE DISTRIBUTION AND VARIABILITY OF VARIOUS TRACE CONSTITUENTS, AND THE NATURE AND EXTENT OF DYNAMICAL INTERACTIONS BETWEEN THE LOWER AND MIDDLE ATMOSPHERES. EMPHASIS IS PLACED ON THE ROLES WHICH LARGE-SCALE WAVE MOTIONS PLAY IN MAINTAINING THE BUDGETS OF MOMENTUM, HEAT, AND TRACE CONSTITUENT CONCENTRATIONS ON A GLOBAL BASIS IN THE MIDDLE ATMOSPHERE.

----- WARS-2, HOUGHTON-----

INVESTIGATION NAME- AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)

NSSDC ID- WARS-2 -11

INVESTIGATIVE PROGRAM
CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.T. HOUGHTON	OXFORD U
O1 - R. HUMMERMAN	READING U
O1 - M. MADLEY	RUTHERFORD/APPLTON LAB
O1 - K.W. DEWIS	RUTHERFORD/APPLTON LAB
O1 - G.D. PERKETT	OXFORD U
O1 - C.D. HODGERS	OXFORD U
O1 - E.J. WILLIAMSON	OXFORD U
O1 - J.J. BARNETT	OXFORD U
O1 - J.G. WHITNEY	OXFORD U
O1 - C.A. BAILEY	OXFORD U
O1 - S.R. THORNTON	OXFORD U
O1 - J.S. SEELEY	READING U

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO MAKE GLOBAL MEASUREMENTS OF RADIATION FROM CO2, H2O, CO, NO, N2O, AND CH4. THESE MEASUREMENTS YIELD (1) THE KINETIC TEMPERATURE, VIBRATIONAL TEMPERATURE, AND ALTITUDE DISTRIBUTION FOR CO2; (2) THE H2O CONCENTRATION FROM 15 TO 150 KM; (3) THE CO ALTITUDE DISTRIBUTION; (4) THE NO ALTITUDE DISTRIBUTION; (5) THE N2O ALTITUDE DISTRIBUTION; AND (6) THE CH4 ALTITUDE DISTRIBUTION. THESE PARAMETERS ARE OBTAINED AS A FUNCTION OF TIME AND LOCATION. THE IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER IS AN INFRARED RADIOMETER OBSERVING THERMAL EMISSION AND RESONANCE FLUORESCENCE OF SOLAR RADIATION FROM THE ATMOSPHERIC LIMB BY GAS CORRELATION SPECTROSCOPY. THE SPECTRAL RANGE COVERED IS 2.7 TO 100 MICROMETERS. THE ALTITUDE RANGE EXTENDS FROM 15 TO 150 KM, DEPENDING UPON THE PARTICULAR SPECIES MEASURED. FOR MOST CHANNELS, VERTICAL PROFILES OF TEMPERATURE (TO APPROXIMATELY 1 DEG K ACCURACY) AND COMPOSITION (TO APPROXIMATELY 10 PERCENT) CAN BE MADE WITH A VERTICAL RESOLUTION BETTER THAN 4 KM AND A HORIZONTAL RESOLUTION OF 400 KM (LIMITED BY GEOMETRY OF LIMB PATH).

----- WARS-2, LONDON-----

INVESTIGATION NAME- RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY

NSSDC ID- WARS-2 -19

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - J. LONDON	U OF COLORADO
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BRIEF DESCRIPTION

THIS INVESTIGATION DEALS WITH THE NATURAL VARIABILITY OF THE THERMAL STRUCTURE AND OZONE CONCENTRATION OF THE UPPER ATMOSPHERE WITH EMPHASIS ON THEIR RESPONSE TO SIGNIFICANT SOLAR VARIABILITY. IT PROVIDES DEFINITIVE TESTS FROM ANALYSIS OF RETRIEVED DATA OF SPECIFIED MECHANISMS BY WHICH OZONE VARIATIONS ARE IN RESPONSE TO VARIATIONS IN SOLAR ACTIVITY. A TWO-FOLD APPROACH IS USED: DATA ANALYSIS AND STATISTICAL

EVALUATION OF THE PERTINENT UPPER-ATMOSPHERE PARAMETERS AS THEY RELATE TO VARIOUS FORMS OF SOLAR ACTIVITY; AND THEORETICAL STUDY OF THE SENSITIVITY OF REALISTIC MODELS OF THE OZONE PHOTOCHEMICAL EQUILIBRIUM SYSTEM AS RELATED TO OBSERVED AND SUGGESTED SOLAR VARIABILITY.

----- UARS-2, MILLER-----

INVESTIGATION NAME- SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETA.
OF UARS METEOROLOGICAL INFORMATION

NSSDC ID- UARS-2 -16

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. MILLER
OI - R.S. QUINCY

NOAA-NMC
NOAA-NMC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MERGE TEMPERATURE AND WIND MEASUREMENTS IN THE STRATOSPHERE AND MESOSPHERE WITH THE OPERATIONAL NATIONAL WEATHER SERVICE ANALYSES. ENERGY BUDGET TERMS ARE EVALUATED, AND HEIGHT AND TEMPERATURE FIELDS (PLANETARY WAVES) ARE ANALYZED BY FOURIER ANALYSIS. THE INTERLAYER DYNAMIC COUPLING AMONG THE TROPOSPHERE, STRATOSPHERE, AND MESOSPHERE ALSO IS STUDIED.

----- UARS-2, MOUNT-----

INVESTIGATION NAME- ULTRAVIOLET OZONE SPECTROMETER

NSSDC ID- UARS-2 -03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - G.H. MOUNT
OI - C.A. DARTH
OI - C.W. HORD
OI - D.W. RUSCH

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BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE THE OZONE DENSITY IN THE ALTITUDE RANGE FROM 40 TO 90 KM, BY OBSERVING THE ATTENUATION OF RAYLEIGH-SCATTERED SUNLIGHT IN THE NEAR ULTRAVIOLET AT WAVELENGTHS FROM 2400 TO 3400 Å; AND TO DETERMINE THE NITRIC OXIDE (NO) DENSITY IN THE ALTITUDE RANGE FROM 80 TO 250 KM BY OBSERVING THE SUNLIGHT FLUORESCENTLY SCATTERED IN THE NO GAMMA BANDS AT 2100 TO 2400 Å. THE FLIGHT INSTRUMENT IS A 250-MM FOCAL LENGTH, OFF-AXIS, PARABOLIC TELESCOPE AND DUAL CHANNEL 1/8-M EBERT-FASTIE SPECTROGRAPH EMPLOYING TWO PHOTOMULTIPLIER TUBES OPERATING IN THE SPECTRAL RANGES 2100-3100 Å AND 2400-3400 Å AT 20-Å RESOLUTION. THE INSTRUMENT IS MOUNTED ONTO A SCAN PLATFORM, ALLOWING SCANNING OF THE EARTH'S LIMB IN 3-KM HEIGHT INCREMENTS IN A TIME PERIOD OF 12 S. OPERATING MODES INCLUDE (1) SIMULTANEOUS INTENSITY MEASUREMENTS AT TWO WAVELENGTHS SEPARATED BY APPROXIMATELY 300 Å, (ONE WHERE THE OZONE ABSORPTION IS STRONG AND ONE WHERE IT IS WEAK AS THE SCAN PLATFORM SCANS THE EARTH'S LIMB), AND (2) MEASUREMENT OF THE GAMMA BANDS IN THE RANGE 2150 TO 2450 Å AS THE INSTRUMENT IS SCANNED THROUGH THE EARTH'S LIMB.

----- UARS-2, POTEMRA-----

INVESTIGATION NAME- MAGNETOMETER EXPERIMENT

NSSDC ID- UARS-2 -26

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - T.A. POTEMRA
OI - M. SUGIURA

APPLIED PHYSICS LAB
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO MONITOR AND INVESTIGATE LARGE-SCALE, FIELD-ALIGNED CURRENTS THAT ARE AN IMPORTANT ELEMENT IN THE COUPLING PROCESSES OF THE SOLAR WIND-MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE SYSTEM. THE INSTRUMENT IS A TRIAXIAL FLUXGATE MAGNETOMETER WITH A TOTAL RANGE OF PLUS OR MINUS 60,000 NT MEASURING THE VECTOR MAGNETIC FIELD AT THE RATE OF 16 TIMES PER S WITH A RESOLUTION OF 7.3 NT. THE INSTRUMENT IS BOOM MOUNTED.

----- UARS-2, REBER-----

INVESTIGATION NAME- ANALYTIC-EMPIRICAL MODELING OF UPPER
ATMOSPHERE PARAMETERS

NSSDC ID- UARS-2 -21

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - C.A. REBER
OI - F.T. HUANG
OI - A.E. MEDIN
OI - J.E. FREDERICK
OI - J. LONDON
OI - E. NILSENATH

NASA-GSFC
COMPUTER SCIENCES CORP
NASA-GSFC
NASA-GSFC
U OF COLORADO
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE THE ORGANIZATION, EMPIRICAL MODELING, AND GEOPHYSICAL INTERPRETATION OF THE VARIOUS DATA ACQUIRED FROM THE UARS. A SECONDARY OBJECTIVE IS THE ACQUISITION OF COMPLEMENTARY DATA FROM OTHER SOURCES (E.G., THE OPERATIONAL NOAA SATELLITES) FOR USE IN THIS ANALYSIS AND FOR USE BY THE UARS SCIENCE TEAM. A SUBSTANTIAL PART OF THE INVESTIGATION IS THE CALCULATION OF A TIME-DEPENDENT THREE-DIMENSIONAL ANALYTIC-EMPIRICAL MODEL USING DATA ON ATMOSPHERIC TEMPERATURE, MINOR SPECIES MIXING RATIOS, ETC. THE MODELING TECHNIQUE IS A DIRECT FOLLOW-UP TO THE 'OGG MODEL' AND THE 'MASS SPECTROMETER-INCOHERENT SCATTER (MSIS) MODEL' WHICH HAVE PROVEN QUITE SUCCESSFUL FOR THERMOSPHERIC RESEARCH, AND TO THE CURRENT EMPIRICAL OZONE MODEL. ALL OF WHICH WERE DEVELOPED AND ARE AVAILABLE AT THE GODDARD SPACE FLIGHT CENTER, CODE 698, GREENBELT, MD 20771.

----- UARS-2, ROCHE-----

INVESTIGATION NAME- ALTITUDE DISTRIBUTION OF ATMOSPHERIC
MINOR SPECIES AND TEMP. IN 10-60KM RANGE

NSSDC ID- UARS-2 -05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.E. ROCHE
OI - J.B. KURER
OI - R.D. SEARS
OI - T.C. JAMES
OI - L.R. MEGILL
OI - R.D. BAKER
OI - D.G. MURCRAY
OI - A. GOLDMAN

LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
UTAH STATE U
UTAH STATE U
U OF DENVER
U OF DENVER

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO REMOTELY MEASURE THE STRATOSPHERIC COMPOSITION (H₂O, N₂O, NO_x, HNO₃, Cl₂, ClO, HCL, O₃, CO₂, AND CH₄) AND TEMPERATURE IN THE 10- TO 60-KM ALTITUDE RANGE. THE COMPOSITION AND TEMPERATURE ARE DETERMINED FROM MEASUREMENTS OF LIMB EMISSION SPECTRA IN THE 3.5- TO 12-MICROMETER INFRARED WAVELENGTH BAND. THE NECESSARY HIGH SENSITIVITY, BACKGROUND FLUX DISCRIMINATION, AND SPECTRAL RESOLUTION ARE PROVIDED BY A CRYOGENICALLY COOLED SOLID ETALON SPECTROMETER USING A LINEAR DETECTOR ARRAY TO SIMULTANEOUSLY COVER THE 10- TO 60-KM RANGE WITH 2-KM RESOLUTION. THE SPECTRAL RESOLUTION IS 0.25 INVERSE CENTIMETER. THREE DAYS ARE REQUIRED TO ACHIEVE GLOBAL COVERAGE WITHIN THE 75 DEG LATITUDE FOR THE 70 DEG ORBIT.

----- UARS-2, ROTTMAN-----

INVESTIGATION NAME- ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE
EXPERIMENT

NSSDC ID- UARS-2 -04

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL

PI - G.J. ROTTMAN
OI - J. LONDON

U OF COLORADO
U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE SOLAR SPECTRUM AT WAVELENGTHS BETWEEN 120 AND 500 NM WITH AN ABSOLUTE ACCURACY BETTER THAN 10 PERCENT. TEMPORAL VARIATIONS OF THE SOLAR RADIATION ARE FOLLOWED TO WITHIN 1-2 PERCENT DURING THESE MISSIONS. THERE IS A 1/8 M EBERT-FASTIE SPECTROMETER WITH APPROXIMATELY 0.15-NM SPECTRAL RESOLUTION ON BOARD. IT HAS THREE SEPARATE DATA CHANNELS, EACH USING A PHOTOTUBE OPTIMIZED FOR DIFFERENT, BUT OVERLAPPING, PORTIONS OF THE INSTRUMENT SPECTRAL RANGE. SOLAR DATA ARE TAKEN ON A DAILY BASIS AND ANALYZED TO ESTABLISH CORRELATIONS OF THE SPECTRAL

IRRADIANCE WITH SOLAR ROTATION AND WITH SOLAR ACTIVITY (10.7-CM FLUX LEVELS, SUNSPOT NUMBER, CALCIUM PLAGE AREA, SOLAR FLARES, ETC.). THE NORMAL MODE OF OPERATION INVOLVES A 4-M DUTY CYCLE PER DAY. OF THIS TOTAL TIME, 1 M IS SPENT OBSERVING THE SUN AND THE REMAINDER OF THE TIME IS SPENT IN CALIBRATION ACTIVITIES. TEN TO 15 STARS ARE CHOSEN FOR THE CALIBRATION PROGRAM.

----- UARS-2, RUSSELL, 3RD-----

INVESTIGATION NAME- HALOGEN OCCULTATION EXPERIMENT (HALOE)

NSSDC ID- UARS-2 -09

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.W. RUSSELL, 3RD	NASA-LARC
O1 - J. PARK	COLL OF WILLIAM + MARY
O1 - S.R. DRAYSON	U OF MICHIGAN
O1 - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
O1 - R.J. CICERONE	U OF CALIF, SAN DIEGO
O1 - P.L. HAMST	ENVIRON PROTECT AGENCY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE, USING SOLAR OCCULTATION TECHNIQUES, THE UPPER-ATMOSPHERIC VERTICAL CONCENTRATION PROFILES OF H₂O, O₃, HCL, HF, HO, CH₄, HNO₃, AND CO₂. PRESSURE IN THE ALTITUDE RANGE FROM 10 TO 55 KM IS MEASURED. MEASUREMENTS ARE USED TO STUDY TRACE GAS SOURCES AND SINKS AND UPPER ATMOSPHERE TRANSPORT, AND TO VALIDATE PHOTOCHEMICAL AND ATMOSPHERIC DYNAMICS MODELS. A FOUR-CHANNEL GAS FILTER CORRELATION RADIOMETER AND A FIVE-CHANNEL FILTER RADIOMETER MOUNTED ON A COMMON CHASSIS WITH AZIMUTH AND ELEVATION CAPABILITY ARE USED. THE GAS FILTER CORRELATION RADIOMETRY IS USED TO MEASURE THE HCL, HF, CH₄, HO, AND CO₂, AND BROADBAND FILTER SPECTROSCOPY IS USED TO MEASURE H₂O, O₃, HNO₃, AND CO₂. THE CO₂ DATA ARE USED TO OBTAIN THE ATMOSPHERIC PRESSURE PROFILE.

----- UARS-2, THUILLIER-----

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE

NSSDC ID- UARS-2 -01

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - G. THUILLIER	CNRS-SA
O1 - P. CONNES	PARIS OBSERVATORY
O1 - M. TEITELBAUM	CNRS-SA
O1 - M.L. DUBOIN	CNET
O1 - P. BLUM	U OF BONN
O1 - S.S. CHANDRA	NASA-GSFC

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO MEASURE SIMULTANEOUSLY THE WIND AND TEMPERATURE IN THE HIGH MESOSPHERE AND LOW THERMOSPHERE, AND TO DERIVE THE EDDY DIFFUSION COEFFICIENT USING A REMOTE-SENSING METHOD. ABSOLUTE LINE INTENSITIES ARE ALSO MEASURED. THE FLIGHT INSTRUMENT IS COMPOSED OF TWO MAIN UNITS. THE UPPER PART IS A CASSEGRAIN-TYPE TELESCOPE. THE LOWER PART CONSISTS OF A FIELD-COMPENSATED NICHOLSON INTERFEROMETER AND ASSOCIATED OPTICS, DETECTORS, LASER UNIT, ELECTROMECHANISMS, AND ELECTRONICS. THE WAVELENGTHS MEASURED (IN ANGSTROMS) ARE 9577, 6380, 7278, 7319, AND 7371. THE SPECTRAL SCANNING IS ACHIEVED BY A SMALL-ANGLE PRISM, CHANGING THE OPTICAL PATH OF APPROXIMATELY 1 WAVELENGTH IN 16 STEPS. THE LIMB IS SCANNED IN STEPS FROM 480 TO 70 KM. THE FIELD OF VIEW IS 2 DEG IN A HORIZONTAL PLANE AND THE VERTICAL FIELD OF VIEW VARIES FROM 16 ARC MIN IN THE THERMOSPHERE, TO 4 ARC MIN FOR MESOSPHERIC OBSERVATIONS. THE DURATION OF A COMPLETE SCAN FOR A GIVEN LINE IS 1.6 S.

----- UARS-2, TORR-----

INVESTIGATION NAME- ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER

NSSDC ID- UARS-2 -15

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.G. TORR	U OF UTAH
O1 - M.R. TORR	U OF UTAH
O1 - T.M. DONAHUE	U OF MICHIGAN
O1 - A.F. NAGY	U OF MICHIGAN
O1 - E.B. YOUNG	U OF MICHIGAN
O1 - S.C. LIU	NOAA
O1 - R.J. CICERONE	U OF CALIF. SAN DIEGO

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO MAKE HIGH-RESOLUTION STUDIES OF TRACE CONSTITUENTS IN THE MIDDLE ATMOSPHERE. THE CONSTITUENTS ARE OBSERVED THROUGH ABSORPTION OF RAYLEIGH-SCATTERED SUNLIGHT, RESONANCE FLUORESCENCE OF SUNLIGHT AT ULTRAVIOLET WAVELENGTHS, CHEMILUMINESCENCE, AND PARTICLE IMPACT EXCITATION. THE INVESTIGATION ALSO MONITORS PARTICLE PRECIPITATION FROM THE INCLUDED EMISSIONS AT 3914 AND 4278A. AN ECHELLE GRATING SPECTROGRAPH MEASURES THE CONCENTRATIONS OF THE TRACE CONSTITUENTS, O₃, OM, CLO, NO, AND NO₂ AT STRATOSPHERIC AND MESOSPHERIC ALTITUDES. A HIGH-RESOLUTION (0.04A) ATLAS WILL BE COMPILED IN BOTH ABSORPTION AND EMISSION. THE WAVELENGTH RANGE IS 2000 TO 4600A. THE IMAGING CAPABILITY PERMITS A 50-KM ALTITUDE PROFILE (E.G., 20 TO 70 KM) TO BE OBSERVED SIMULTANEOUSLY AT 5-KM RESOLUTION.

----- UARS-2, WATERS-----

INVESTIGATION NAME- MICROWAVE LIMB SOUNDER (MLS)

NSSDC ID- UARS-2 -13

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.W. WATERS	NASA-JPL
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BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE WIND, O₃, CLO, H₂O₂, TEMPERATURE, O₂, CO, H₂O, MAGNETIC FIELD, AND PRESSURE IN THE UPPER ATMOSPHERE. THE SPECTRAL REGION COVERED IS FROM 63 TO 231 CMZ. THE SAMPLED ALTITUDE RANGE EXTENDS FROM 15 TO 110 KM. THE INSTRUMENT HAS A 2-S INTEGRATION TIME WITH LONGER INTEGRATIONS PERFORMED AS APPROPRIATE DURING DATA REDUCTION. ABSOLUTE ACCURACY OF THIS MICROWAVE LIMB SOUNDER (MLS) IS APPROXIMATELY 5 PERCENT FOR COMPOSITION, APPROXIMATELY 2 DEG K FOR TEMPERATURE, AND APPROXIMATELY 3 M/S FOR WINDS. VERTICAL RESOLUTION FOR PROFILE MEASUREMENTS IS 3-6 KM; HORIZONTAL RESOLUTION IS 30 KM ACROSS AND 300 KM ALONG THE OBSERVATION DIRECTION. COMPLETE PROFILES ARE OBTAINED IN LESS THAN 50 S.

----- UARS-2, WINNINGHAM-----

INVESTIGATION NAME- PARTICLE ENVIRONMENT MONITOR (PEM)

NSSDC ID- UARS-2 -07

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - J.D. WINNINGHAM	SOUTHWEST RES INST
O1 - P.R. BANKS	STANFORD U
O1 - J.L. BURCH	SOUTHWEST RES INST
O1 - R.G. GUNTON	LOCKHEED PALO ALTO
O1 - M.L. IMHOF	LOCKHEED PALO ALTO
O1 - J.B. REAGAN	LOCKHEED PALO ALTO
O1 - M.H. REES	U OF ALASKA
O1 - G.C. REID	NOAA
O1 - R.G. ROBLE	NATL CTR FOR ATMOS RES
O1 - P.J. CRUTZEN	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE GLOBAL INPUT OF CHARGED-PARTICLE ENERGY INTO THE EARTH'S STRATOSPHERE, MESOSPHERE, AND THERMOSPHERE AND THE PREDICTED ATMOSPHERIC PROCESSES. DIRECT IN SITU MEASUREMENTS OF PRECIPITATION ELECTRONS IN THE ENERGY RANGE FROM 100 EV TO 5 MEV AND OF PROTONS IN THE ENERGY RANGE FROM 0.5 TO 200 MEV (WITH OPTION OF EXTENDING PROTON MEASUREMENTS DOWN TO 100 EV) ARE MADE WITH A MEDIUM-ENERGY PARTICLE SPECTROMETER (MEPS) AND A HIGH-ENERGY PARTICLE SPECTROMETER (HEPS). IN ADDITION, GLOBAL IMAGES AND ENERGY SPECTRA OF ATMOSPHERIC X RAYS PRODUCED BY ELECTRON PRECIPITATION ARE PERFORMED OVER THE ENERGY RANGE FROM 6 TO 150 KEV WITH AN ATMOSPHERIC X-RAY IMAGING SPECTROMETER. THE DATA FROM THESE INSTRUMENTS ARE USED AS INPUT TO COMPUTATIONAL MODELS.

----- UARS-2, ZUREK-----

INVESTIGATION NAME- RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE

NSSDC ID- UARS-2 -23

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - R.W. ZUREK

NASA-JPL

BRIEF DESCRIPTION

THE OVERALL OBJECTIVE OF THIS INVESTIGATION IS TO CONSTRUCT A COMPREHENSIVE AND CONSISTENT CLIMATOLOGY OF THE MESOSPHERE AS OBSERVED BY THE UARS SATELLITES. FROM THE MESOSPHERIC DATA, THIS ANALYSIS PRODUCES (1) THE RADIATIVE BUDGET BASED ON O3 AND O2 ABSORPTION OF SOLAR RADIANCE AND CO2 EMISSION, INCLUDING THE EFFECTS ON THE LATTER OF NON-THERMODYNAMIC EQUILIBRIUM; AND (2) THE DYNAMICAL CLIMATOLOGY OF THE MESOSPHERE, SHOWING THE RELATIVE CONTRIBUTIONS TO THE HEAT AND MOMENTUM BUDGETS BY ADIABATIC HEATING, BY THE MEAN MERIDIONAL CIRCULATION, AND BY EDDIES (WAVES). THE EDDY CONTRIBUTION IS SEPARATED INTO STANDING AND TRANSIENT COMPONENTS WHICH INCLUDE DYNAMICAL FLUXES DUE TO ATMOSPHERIC TIDES.

***** UOSAT*****

SPACECRAFT COMMON NAME- UOSAT
ALTERNATE NAMES-

NSSDC ID- UOSAT

LAUNCH DATE- 09/15/81 WEIGHT- 54. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA 2310

SPONSORING COUNTRY/AGENCY
UNITED STATES
UNITED KINGDOM

AMSAT
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PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOSTATIONARY
ORBIT PERIOD- 94.6 MIN
PERIAPSIS- 530. KM ALT

INCLINATION- 97.5 DEG
APOAPSIS- 530. KM ALT

PERSONNEL
MG - D. DANIELS
SC - J.A. KING
PM - M.W. SWEETING
PS - R.A. PARISE

NASA HEADQUARTERS
AMSAT CORP
U OF SURR
AMSAT CORP

BRIEF DESCRIPTION

THE EXPERIMENTS SELECTED TO BE PART OF THE UOSAT PAYLOAD HAVE SEVERAL OBJECTIVES WHICH INCLUDE THE FOLLOWING: TO PROVIDE THE EDUCATIONAL COMMUNITY WITH AN OPERATIONAL SCIENTIFIC SATELLITE WHICH CAN BE UTILIZED WITH A MINIMAL GROUND STATION; TO PROVIDE THE SCIENTIFIC COMMUNITY WITH A NEW SOURCE OF DATA TO AID IN THE UNDERSTANDING OF THE ELECTRO-MAGNETIC PROPERTIES OF THE NEAR EARTH ENVIRONMENT; AND TO PROVIDE THE AMATEUR RADIO COMMUNITY WITH A FULL COMPLEMENT OF INSTRUMENTS FOR THE STUDY AND MONITORING OF RADIO PROPAGATION CONDITIONS FROM THE HIGH FREQUENCY TO MICROWAVE. IN ORDER TO MEET THESE OBJECTIVES THE FOLLOWING INSTRUMENTS ARE INCLUDED IN THE UOSAT PAYLOAD: A TRIAXIAL FLUXGATE MAGNETOMETER WITH A RESOLUTION OF PLUS OR MINUS 2 NT AND MAXIMUM VECTOR SAMPLE RATE OF 6.25 PER S, TWO CHARGED PARTICLE COUNTERS WITH THRESHOLD ENERGIES OF 20 AND 60 KEV, FOUR-PHASE REFERENCED HIGH-FREQUENCY (H.F.) BEACONS AT 7, 14, 21, AND 28 MHZ, TWO MICROWAVE BEACONS AT 2.4 AND 10.47 GHZ, AND CCD EARTH IMAGING CAMERA WITH 2 KM RESOLUTION, AND SPECTRAL RESPONSE OF 0.4 - 1.0 MICROMETERS. ONE VHF, AND ONE UHF TELEMETRY CHANNEL PROVIDE DATA IN STANDARD FSK ASCII AT A VARIETY OF BAUD RATES, AS WELL AS MORSE CODE, AND SYNTHESIZED VOICE FORMATS.

----- UOSAT, ACUNA-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- UOSAT -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - M.M. ACUNA

NASA-GSFC

BRIEF DESCRIPTION

THE MAGNETOMETER PROVIDES VECTOR MEASUREMENTS OF THE EARTH'S MAGNETIC FIELD. THE OUTPUT OF THE EXPERIMENT CONSISTS OF A VECTOR SAMPLE OF THE FIELD APPROXIMATELY ONCE EVERY S. EACH MEASUREMENT CYCLE PROVIDES THREE ANALOG SIGNALS REPRESENTING THE MAGNETIC FIELD COMPONENTS BX, BY, AND BZ AS WELL AS THREE 16-BIT DIGITAL VERSIONS OF THESE VALUES. THE ON-BOARD COMPUTER IS SENT A SERIES OF SEVEN 10 MS STROBE PULSES. THESE SEVEN STROBES OCCUR AT 20 MS INTERVALS GIVING: A CALIBRATION WORD AND THE MOST SIGNIFICANT BYTE (MSB) AND THE LEAST SIGNIFICANT BYTE (LSB) OF THE MAGNETIC FIELD COMPONENTS BX MSB, BY MSB, BZ MSB, BX LSB, BY LSB, AND BZ LSB. THUS THE COMPLETE SAMPLE LENGTH IS 160 MS OF EACH S. EACH VECTOR COMPONENT IS REPRESENTED BY 16 BITS OF WHICH 1 COUNT EQUALS 2

NT AND THE DYNAMIC RANGE IS 2 TO POWER 15. THE MAXIMUM SAMPLE RATE AT A SPACECRAFT BIT RATE OF 1.2 KB/S IS 6.25 VECTOR SAMPLES PER S.

----- UOSAT, FEREDDE-----

INVESTIGATION NAME- CHARGED PARTICLE

NSSDC ID- UOSAT -03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - I.C. FEREDDE
OI - D. LEPINE
OI - D.A. BRYANT
OI - P. GUTTRIDGE

U OF SURR
RUTHERFORD/APPLTON LAB
RUTHERFORD/APPLTON LAB
MULLARD SPACE SCI LAB

BRIEF DESCRIPTION

THE SYSTEM WILL INCORPORATE TWO GEIGER COUNTERS WITH ELECTRON THRESHOLD ENERGIES OF 20 AND 60 KEV. THESE ENERGIES HAVE BEEN CHOSEN TO GIVE GOOD RESOLUTION OF AURORAL ACTIVITY FOR THE STUDY OF VHF RADIO PROPAGATION EFFECTS. THE INSTRUMENTS OUTPUT IS IN THE FORM OF A 12-BIT COUNT SUPPLIED TO THE ON-BOARD COMPUTER AT A MAXIMUM RATE OF ONCE EVERY 200 MS.

----- UOSAT, SMITHERS-----

INVESTIGATION NAME- HIGH FREQUENCY BEACON

NSSDC ID- UOSAT -04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - C.W. SMITHERS
OI - M.J. UNDERHILL

U OF SURR
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BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE THE INVESTIGATION OF TRANS-IONOSPHERIC PROPAGATION OF HIGH-FREQUENCY (H.F.) RADIO SIGNALS, AND THE MEASUREMENT OF IONOSPHERIC ELECTRON COLUMN DENSITIES BY PHASE-REFERENCED OBSERVATIONS AT MULTIPLE FREQUENCIES. THE INSTRUMENT TRANSMITTER RADIATES UP TO FOUR PHASE-REFERENCED H.F. SIGNALS SIMULTANEOUSLY. THESE SIGNALS ARE ALL SYNTHESIZED FROM THE SAME OSCILLATOR USING FREQUENCY DIVISION TECHNIQUES. THE APPROXIMATE FREQUENCIES CHOSEN FOR THE EXPERIMENT ARE 7, 14, 21, AND 28 MHZ.

----- UOSAT, SWEETING-----

INVESTIGATION NAME- EARTH IMAGING

NSSDC ID- UOSAT -02

INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - M.W. SWEETING

U OF SURR

BRIEF DESCRIPTION

THE VIDEO DISPLAY AND IMAGING SYSTEM CONSIST OF A CCD CAMERA AND 256 KBIT VIDEO MEMORY. SNAP-SHOT PICTURES OF THE EARTH'S SURFACE COVERING 512 X 512 KM WILL BE TAKEN BY THE CAMERA AND STORED IN THE VIDEO MEMORY FOR SUBSEQUENT TRANSMISSION TO THE GROUND. THE ON-BOARD COMPUTER CAN HAVE ACCESS TO THE VIDEO MEMORY ENABLING ON-BOARD PICTURE PROCESSING AND GRAPHIC DISPLAY OF COMPUTER DATA. EACH IMAGE WILL CONTAIN 256 X 256 PIXELS, WITH A RESOLUTION OF 2 KM PER PIXEL, AND A SPECTRAL RESPONSE OF 0.4 - 1.0 MICROMETERS. PICTURE DATA WILL BE TRANSMITTED AT 1.2 KB/S SYNCHRONOUSLY WITH A 32-BIT SYNC WORD AT THE BEGINNING OF EACH LINE.

----- UOSAT, SWEETING-----

INVESTIGATION NAME- MICROWAVE BEACON

NSSDC ID- UOSAT -05

INVESTIGATIVE PROGRAM
CODE EC/CO-OP

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL

PI - M.W. SWEETING

U OF SURR

BRIEF DESCRIPTION

THE BEACONS AT 2.4 AND 10.47 GHZ ARE INTENDED TO DEMONSTRATE THE FEASIBILITY OF USING THE HIGHER FREQUENCY BANDS IN TRANSPONDER APPLICATIONS FOR FUTURE AMATEUR COMMUNICATIONS SATELLITES, AND TO ENCOURAGE THE DEVELOPMENT OF RELATIVELY INEXPENSIVE MICROWAVE GROUND STATION EQUIPMENT BY AMATEURS. THE SPACECRAFT-TO-GROUND TRANSMISSION LINK BUDGET IS VERY MARGINAL, AND WILL REQUIRE CONSIDERABLE SKILL TO OVERCOME DOPPLER AND AZ-EL TRACKING REQUIREMENTS.

***** VOIR*****

SPACECRAFT COMMON NAME- VOIR
ALTERNATE NAMES-

NSSDC ID- VOIR

LAUNCH DATE- 08/25/86 WEIGHT- 1000. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OS3

PLANNED ORBIT PARAMETERS
ORBIT TYPE- VENUS ORBITER
ORBIT PERIOD- 85.8 MIN
PERIAPSIS- 250. KM ALT INCLINATION- 87. DEG
APOAPSIS- 250. KM ALT

PERSONNEL
MG - R. MILLS NASA HEADQUARTERS
SC - J.M. BOYCE NASA HEADQUARTERS
PM - J. GERPHEIDE NASA-JPL
PS - R.S. SAUNDERS NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVES OF THE VENUS ORBITING IMAGING RADAR (VOIR) MISSION ARE TO MAP THE SURFACE OF VENUS GLOBALLY WITH IMAGING RADAR AT BETTER THAN 1-KM RESOLUTION TO UNDERSTAND THE PLANET'S PRESENT STATE AND GEOLOGICAL HISTORY; AND TO INVESTIGATE THE SURFACE PHYSICS, INTERIOR PHYSICS, LOWER ATMOSPHERE, AND IONOSPHERE FROM A LOW CIRCULAR ORBIT. VOIR CARRIES INSTRUMENTS FOR RADAR IMAGING AND ALTIMETRY, GRAVITY, AIRGLOW PHOTOMETRY, MICROWAVE RADIOMETRY, MASS SPECTROSCOPY, ELECTRON TEMPERATURE AND DENSITY, AND IONOSPHERIC DYNAMICS. VOIR WILL BE INSERTED INTO ORBIT AT VENUS ON APPROXIMATELY DECEMBER 15, 1986. RADAR MAPPING WILL BEGIN IN FEBRUARY 1987. THE SPACECRAFT IS POWERED BY SOLAR PANELS AT 70 DEG W. ATTITUDE CONTROL IS THREE-AXIS, NAJIR-POINTING. COMMUNICATIONS IS ON X-BAND AT 1 MEGABIT/S. AN ONBOARD TAPE RECORDER CAN STORE 1.E+9 BITS.

----- VOIR, BARTH-----

INVESTIGATION NAME- AIRGLOW PHOTOMETER

NSSDC ID- VOIR -04 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.A. BARTH U OF COLORADO
CI - D.W. RUSCH U OF COLORADO
CI - A.I. STEWART U OF COLORADO
CI - R.J. THOMAS U OF COLORADO

BRIEF DESCRIPTION
THE OBJECTIVE OF THE AIRGLOW PHOTOMETER EXPERIMENT IS TO MEASURE THE ULTRAVIOLET, VISIBLE, AND INFRARED NIGHT AIRGLOW OF VENUS. THIS WILL REVEAL THE THERMOSPHERIC CIRCULATION OF OXYGEN AND NITROGEN ATOMS FROM THE DAY SIDE TO THE NIGHT SIDE. THE INSTRUMENT IS A THREE-CHANNEL PHOTOMETER. CHANNEL 1 IS FROM .18 TO .28 MICROMETERS, CHANNEL 2 IS FROM .38 TO .60 MICROMETERS, AND CHANNEL 3 IS 1.27 MICROMETERS. THE INSTRUMENT HAS A MASS OF 2.75 KG AND USES 2.5 W. THE DATA RATE IS 48 BPS.

----- VOIR, BRACE-----

INVESTIGATION NAME- ELECTRON TEMPERATURE AND DENSITY

NSSDC ID- VOIR -07 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - L.H. BRACE NASA-GSFC
CI - P.M. BANKS STANFORD U
CI - G.R. CARIGNAN U OF MICHIGAN
CI - W.B. HANSON U OF TEXAS, DALLAS
CI - W.R. HOEGY NASA-GSFC
CI - H.G. MAYR NASA-GSFC
CI - A.F. NAGY U OF MICHIGAN
CI - R.F. THEIS NASA-GSFC

BRIEF DESCRIPTION
THE INVESTIGATION USES A LANGMUIR PROBE TO STUDY THE STRUCTURE AND DYNAMICS OF THE IONOSPHERE OF VENUS BY MEASURING THE ELECTRON THERMAL BALANCE. THE INSTRUMENT HAS A MASS OF 1.9 KG AND USES 4 W. THE DATA RATE IS 100 BPS.

----- VOIR, NEELIS-----

INVESTIGATION NAME- VENUS IONOSPHERE DYNAMICS

NSSDC ID- VOIR -08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - R.A. NEELIS U OF TEXAS, DALLAS
CI - D. EUCCARO U OF TEXAS, DALLAS
CI - W.B. HANSON U OF TEXAS, DALLAS
CI - C.R. LIPPENCOTT U OF TEXAS, DALLAS
CI - H.G. MAYR NASA-GSFC
CI - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THIS INVESTIGATION USES A RETARDING-POTENTIAL ANALYZER AND AN ION-DRIFT METER TO MEASURE THE ION TEMPERATURE, THE ION SPECIES NUMBER DENSITY, AND THE BULK ION VELOCITY VECTOR IN THE VENUSIAN IONOSPHERE. THE INSTRUMENT HAS A MASS OF 2.9 KG AND USES 4 W OF POWER. THE DATA RATE IS 480 BPS. MEASUREMENT PARAMETERS AND RANGES ARE AS FOLLOWS: (1) CONSTITUENT ION NUMBER DENSITY, FROM 60 TO 6.E+5 CM-3; (2) ION TEMPERATURE, FROM 100 DEG K TO 10.E+5 DEG K; (3) ION DRIFT COMPONENT, 30 M/SEC -5 KM/S; AND (4) TRANSVERSE ION DRIFT COMPONENT, FROM 3 M/S TO 4 KM/S.

----- VOIR, JANSSEN-----

INVESTIGATION NAME- SCANNING MICROWAVE RADIOMETER

NSSDC ID- VOIR -05 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M. JANSSEN NASA-JPL
CI - S. GULKIS NASA-JPL
CI - D.M. STAELIN MASS INST OF TECH
CI - P. SWANSON NASA-JPL
CI - R.W. ZUREK NASA-JPL
CI - D. MUEHLER NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVES OF THE MICROWAVE ATMOSPHERIC EXPERIMENT ARE TO PROVIDE COMPREHENSIVE AND PRECISE DATA ON THE VARIABILITY OF THE DEEP ATMOSPHERE OF VENUS, TO CARRY OUT GLOBAL MAPPING IN DYNAMICALLY SIGNIFICANT COORDINATE SYSTEMS, TO IDENTIFY THE SCALE SIZES AND DISTRIBUTION OF THE VARIOUS ATMOSPHERIC DISTURBANCES, AND TO EXAMINE THE BEHAVIOR OF ZONAL WINDS WITH DEPTH AND LATITUDE. THIS INFORMATION WILL LEAD TO AN UNDERSTANDING OF THE DYNAMIC PROCESSES OCCURRING IN AND BENEATH THE CLOUDS. THE INSTRUMENT IS A THRU-CHANNEL SCANNING MICROWAVE RADIOMETER, OPERATING AT 14, 22, AND 37 GHZ, THAT WILL MEASURE THERMAL EMISSION FROM THE ATMOSPHERE. IT HAS A MASS OF 11 KG AND USES 16 W. THE DATA RATE IS 65 BPS.

----- VOIR, LEFEBVRE-----

INVESTIGATION NAME- GRAVITY, ATMOSPHERIC, AND SOLID TIDES
(GASTE)

NSSDC ID- VOIR -02 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
GRAVITY

PERSONNEL
PI - D.W. LEFEBVRE CNES
CI - G. BALMIND CNES
CI - D. ROYNOT CNES
CI - M. BORDERIES CNES

BRIEF DESCRIPTION
THE OBJECTIVE OF THE GRAVITY, ATMOSPHERIC AND SOLID TIDES EXPERIMENT (GASTE) IS TO CHARACTERIZE THE INTERNAL STRUCTURE OF VENUS AND ITS DYNAMIC STATE. THIS WILL HELP DEFINE MODELS OF THE THERMAL EVOLUTION OF THE PLANET.

----- VOIR, PETTENGILL-----

INVESTIGATION NAME- SYNTHETIC APERTURE RADAR (SAR)

NSSDC ID- VOIR -01 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL
PI - G. PETTENGILL MASS INST OF TECH
CI - SAR INVEST. GROUP SEE APPENDIX B

BRIEF DESCRIPTION

THIS INVESTIGATION IS DESIGNED TO MAP THE SURFACE OF VENUS GLOBALLY USING SYNTHETIC APERTURE RADAR (SAR). RESOLUTION IS BETTER THAN 1 KM. HIGH-RESOLUTION IMAGING COVERS GREATER THAN 90 PERCENT OF THE PLANET WITH A SYNTHETIC ANTENNA LENGTH OF 600 M. LOW-RESOLUTION IMAGING COVERS APPROXIMATELY 1 PERCENT OF THE PLANET WITH A SYNTHETIC ANTENNA LENGTH OF 150 M. FOR A LIST OF THE INVESTIGATORS AND THEIR AREAS OF INTERPRETATION SEE APPENDIX B.

----- VOIR, SJOGREN-----

INVESTIGATION NAME- RADIOMETRY ALTIMETRY GRAVITY (RAGE)

NSSDC ID- VOIR -03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
GRAVITY

PERSONNEL

PI - W.L. SJOGREN	NASA-JPL
CI - M. ANANDA	NASA-JPL
CI - G. BALMIND	CNES
CI - E.M. CHRISTENSEN	NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE RADIOMETRY ALTIMETRY GRAVITY EXPERIMENT (RAGE) IS TO MAP THE VENUS GRAVITY FIELD TO THE $1.E-2$ TO $5.E-2$ M/S SQUARED (1 TO 5 MGAL) LEVEL WITH A RESOLUTION OF 300 TO 600 KM. THREE DIFFERENT APPROACHES WILL BE USED TO EXTRACT GRAVITY-FIELD INFORMATION FROM THE RAW DOPPLER DATA. THESE ARE DIRECT LONG-ARC, NORMAL-POINT RATES, AND SHORT-ARC ANALYSIS.

----- VOIR, SPENCER-----

INVESTIGATION NAME- VENUS THERMOSPHERE DYNAMICS

NSSDC ID- VOIR -06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M.W. SPENCER	NASA-GSFC
CI - G.R. CARIGNAN	U OF MICHIGAN
CI - W.B. HANSON	U OF TEXAS, DALLAS
CI - R.E. HARTLE	NASA-GSFC
CI - R.A. HEELIS	U OF TEXAS, DALLAS
CI - M.G. MAYR	NASA-GSFC
CI - R.F. THEIS	NASA-GSFC
CI - L.E. WHARTON	NASA-GSFC
CI - M.B. NIEMANN	NASA-GSFC

BRIEF DESCRIPTION

THE VENUS THERMOSPHERE DYNAMICS (A STUDY OF NEUTRAL WINDS AND TEMPERATURE BY IN SITU MEASUREMENT) USES A NEUTRAL MASS SPECTROMETER. THE OBJECTIVE OF THE INVESTIGATION IS TO MEASURE THREE COMPONENTS OF THE NEUTRAL WINDS (OXYGEN AND/OR HELIUM) AND THEIR TEMPERATURE AND CONCENTRATION IN THE THERMOSPHERE OF VENUS. THE INSTRUMENT IS A QUADRUPOLE MASS SPECTROMETER WITH VERTICAL AND HORIZONTAL SCANNING BAFFLES. IT MEASURES CONCENTRATIONS IN THE RANGE OF 2 TO 45 U WHERE THE ABUNDANCE EXCEEDS $1.E+4$ CM⁻³. THE MASS OF THE INSTRUMENT IS 7.3 KG AND IT USES 11 W. THE DATA RATE IS 200 BPS.

4

**INDEX OF ACTIVE AND PLANNED SPACECRAFT
AND EXPERIMENTS**

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4. INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS

This index contains the names of all spacecraft and experiments that were either active sometime between June 1, 1980, and May 31, 1981, or planned as of May 31, 1981. The spacecraft are listed alphabetically by both common name and alternate names. The alternate names are printed with a reference to the NSSDC spacecraft common name. Next to the NSSDC spacecraft common name are the sponsoring country and agency, launch date, orbit type, NSSDC ID code, and the current status. The current state includes the epoch date, status, and data rate of all launched spacecraft and experiments. For prelaunch spacecraft, only the status is shown; there is no information shown for prelaunch spacecraft experiments. The status and data rate, for the most part, reflect the state as of May 31, 1981, that became effective on the listed epoch date. However, a few changes subsequent to this date may appear. An explanation of the terms used in these columns may be found in Appendix C. The experiments are listed following the associated spacecraft common name and are ordered alphabetically by the principal investigator's or team leader's last name. The experiment name, NSSDC ID code, and current state are also given for each experiment. Finally, each name is followed by a page number referencing the description of the spacecraft or experiment found in this report.

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INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MJD8YY	STATUS	DATA RATE	PAGE NO.
*PRINC. INVEST. NAME	EXPERIMENT NAME							
1976-059A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	DOD-USAF 06/26/76	GEOCENTRIC	76-059A 76-059A-01	06/27/76 05/00/81	NORMAL NORMAL	STND ZERO	11 11
1977-007A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	DOD-USAF 02/06/77	GEOCENTRIC	77-007A 77-007A-01	02/07/77 02/07/77	NORMAL NORMAL	STND STND	11 11
1979-053A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	DOD-USAF 06/10/79	GEOCENTRIC	79-053A 79-053A-01	06/11/79 06/11/79	NORMAL NORMAL	STND STND	11 11
1981-025A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	DOD-USAF 03/16/81	GEOCENTRIC	81-025A 81-025A-01	03/16/81 05/00/81	NORMAL NORMAL	STND STND	12 12
AE 5	SEE AE-E							
AE-E BRACE BRINTON CHAMPION DOERING HANSON HAYS HEATH MEDIN HINTEREGGER NIER RICE RICE SPENCER	UNITED STATES CYLINDRICAL ELECTROSTATIC PROBE (CEP) BENNETT ION-MASS SPECTROMETER (BIMS) ATMOSPHERIC DENSITY ACCELEROMETER (MESA) PHOTOELECTRON SPECTROMETER (PES) RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) VISIBLE AIRGLOW PHOTOMETER (VAE) BACKSCATTER UV SPECTROMETER (BUV) NEUTRAL ATMOSPHERE COMPOSITION (NACE) SOLAR FUV SPECTROPHOTOMETER (EUVS) OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) CAPACITANCE MANOMETER COLD CATHODE ION GAUGE NEUTRAL ATMOSPHERE TEMPERATURE (NATE)	NASA-OSS 11/20/75	GEOCENTRIC	75-107A 75-107A-01 75-107A-10 75-107A-02 75-107A-03 75-107A-04 75-107A-11 75-107A-16 75-107A-08 75-107A-06 75-107A-07 75-107A-12 75-107A-13 75-107A-09	06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81 06/10/81	INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE	ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO	12 12 12 13 13 13 13 14 14 14 14 14 15 15
AEM-A	SEE HCMH							
AEM-B	SEE SAGE							
AEM-C	SEE MAGSAT							
AEM-D	SEE ERBS-A							
AEROS	SEE SMS 1							
AMPT/CHARGE COMP EXPL	SEE CCE							
AMPT/ION RELEASE MODULE	SEE IHM							
APPL EXPL MISSION A	SEE HCMH							
APPL EXPL MISSION B	SEE SAGE							
ARIEL 6	SEE UK 6							
ASTRO-A	SEE MINOTORI							
ASTRO-B HIYAMOTO HIYAMOTO TANAKA YAMASHITA	JAPAN HADAHARD TRANSFORM TELESCOPE ALL SKY X-RAY MONITOR GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) X-RAY REFLECTING TELESCOPE	ISAS 02/00/83	GEOCENTRIC	ASTRO-B ASTRO-B-02 ASTRO-B-03 ASTRO-B-01 ASTRO-B-04		APPROVED MISSION		101 101 101 101 101
ASTRONOMICAL SATELLITE-A	SEE MINOTORI							
ATMOSPHERE EXPLORER-E	SEE AE-E							
BERKSAT	SEE EUVE							
BHASKARA CALLA	INDIA U.S.S.R. SATELLITE MICROWAVE RADIOMETER (SAMIR)	ISRO UNKNOWN 06/07/79	GEOCENTRIC	79-051A 79-051A-01	06/07/79 06/12/79	NORMAL NORMAL	STND STND	15 15
CCE GLOECKLER MCENTIRE SHELLEY	UNITED STATES CHARGE-ENERGY-MASS SPECTROMETER (CHEM) MEDIUM ENERGY PARTICLE ANALYZER (MEPA) PLASMA COMPOSITION	NASA-OSS 08/00/84	GEOCENTRIC	CCE CCE -03 CCE -02 CCE -01		APPROVED MISSION		101 101 102 102
CHARGE COMPOSITION EXPL	SEE CCE							
COBE HAUSER MATHER SMOOT	UNITED STATES DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)	NASA-OSS 07/01/87	GEOCENTRIC	COBE COBE -02 COBE -01 COBE -03		PROPOSED MISSION		102 102 102 103
COPERNICUS	SEE DAO 3							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS----- EPOCH WDDYY	STATUS	DATA RATE	PAGE NO.
CORSA-B	SEE HAKUCHO							
COS-B	INTERNATIONAL CARAVANE COLLABOR.	ESA GAMMA-RAY ASTRONOMY SPARK CHAMBER EXPERIMENT (25 - 1000 MEV)	08/09/75 GEOCENTRIC	75-072A 75-072A-01	08/09/75 NORMAL 08/09/75 NORMAL	STND STND		15 16
COSMIC BACKGROUND EXPL	SEE COBE							
COSMIC RADIATION SAT B	SEE HAKUCHO							
COSMIC RAY SATELLITE-B	SEE COS-B							
DAUGHTER	SEE ISEE 2							
DE 1	SEE DYNAMICS EXPLORER 1							
DE 2	SEE DYNAMICS EXPLORER 2							
DE-A	SEE DYNAMICS EXPLORER 1							
DE-B	SEE DYNAMICS EXPLORER 2							
DMSP 14537	SEE DMSP 5D-1/F3							
DMSP 15539	SEE DMSP 5D-1/F4							
DMSP 5D-1/F3 AFGWC STAFF SHRUM	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) GAMMA-RAY DETECTOR	05/01/78 GEOCENTRIC		78-042A 78-042A-01 78-042A-04	12/02/79 PARTIAL 03/12/80 PARTIAL 05/01/78 NORMAL	SUBS SUBS STND		16 16 16
DMSP 5D-1/F4 AFGWC STAFF AFGWC STAFF ROTHWELL SAGALYN SNYDER	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) SSM/T-MICROWAVE TEMPERATURE SOUNDER PRECIPITATING ELECTRON SPECTROMETER IONOSPHERIC PLASMA MONITOR PASSIVE IONOSPHERIC MONITOR	06/06/79 GEOCENTRIC		79-050A 79-050A-01 79-050A-06 79-050A-03 79-050A-05 79-050A-04	08/08/80 INOPERABLE 08/08/80 INOPERABLE 08/08/80 INOPERABLE 08/08/80 INOPERABLE 08/08/80 INOPERABLE 08/08/80 INOPERABLE	ZERO ZERO ZERO ZERO ZERO ZERO		17 17 17 17 18 18
DMSP 5D-1/F5 AFGWC STAFF AFGWC STAFF ROTHWELL SAGALYN SNYDER	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR M (SSM) PRECIPITATING ELECTRON SPECTROMETER IONOSPHERIC PLASMA MONITOR PASSIVE IONOSPHERIC MONITOR	GEOCENTRIC		DMSP-F5 DMSP-F5-01 DMSP-F5-02 DMSP-F5-03 DMSP-F5-05 DMSP-F5-04	APPROVED MISSION			103 103 103 103 104 104
DMSP 5D-2/F10 AFGWC STAFF AFGWC STAFF AFGWC STAFF ROTHWELL SAGALYN	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) SSM/T-MICROWAVE TEMPERATURE SOUNDER MICROWAVE IMAGER PRECIPITATING ELECTRON/ION SPECTROMETER IONOSPHERIC/SCINTILLATION MONITOR	GEOCENTRIC		DMSPF10 DMSPF10-01 DMSPF10-02 DMSPF10-05 DMSPF10-04 DMSPF10-03	APPROVED MISSION			104 104 104 105 105 105
DMSP 5D-2/F6 AFGWC STAFF AFGWC STAFF AFGWC STAFF ROTHWELL SAGALYN	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR M-2 (SSM-2) SCANNING X-RAY SPECTROMETER PRECIPITATING ELECTRON/ION SPECTROMETER IONOSPHERIC PLASMA MONITOR	GEOCENTRIC		DMSP-F6 DMSP-F6-01 DMSP-F6-02 DMSP-F6-03 DMSP-F6-05 DMSP-F6-04	APPROVED MISSION			105 105 106 106 106 106
DMSP 5D-2/F7 AFGWC STAFF AFGWC STAFF AFGWC STAFF AFGWC STAFF ROTHWELL SAGALYN	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR M-2 (SSM-2) SSM/T-MICROWAVE TEMPERATURE SOUNDER MAGNETOMETER SPACE RADIATION DOSIMETER PRECIPITATING ELECTRON/ION SPECTROMETER IONOSPHERIC PLASMA MONITOR	GEOCENTRIC		DMSP-F7 DMSP-F7-01 DMSP-F7-02 DMSP-F7-03 DMSP-F7-06 DMSP-F7-07 DMSP-F7-05 DMSP-F7-04	APPROVED MISSION			106 107 107 107 107 107 107 108
DMSP 5D-2/F8 AFGWC STAFF ROTHWELL SAGALYN	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) PRECIPITATING ELECTRON/ION SPECTROMETER IONOSPHERIC/SCINTILLATION MONITOR	GEOCENTRIC		DMSP-F8 DMSP-F8-01 DMSP-F8-03 DMSP-F8-02	APPROVED MISSION			108 108 108 108
DMSP 5D-2/F9 AFGWC STAFF AFGWC STAFF AFGWC STAFF ROTHWELL SAGALYN	UNITED STATES DOD-USAF OPERATIONAL LINESCAN SYSTEM (OLS) SSM/T-MICROWAVE TEMPERATURE SOUNDER MICROWAVE IMAGER PRECIPITATING ELECTRON/ION SPECTROMETER IONOSPHERIC/SCINTILLATION MONITOR	GEOCENTRIC		DMSP-F9 DMSP-F9-01 DMSP-F9-02 DMSP-F9-05 DMSP-F9-04 DMSP-F9-03	APPROVED MISSION			109 109 109 109 109 110
DMSP 5D-2/S10	SEE DMSP 5D-2/F10							
DMSP 5D-2/S6	SEE DMSP 5D-2/F6							

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INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *****PRINC. INVEST. NAME*****	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS----- EPOCH MJDYY	STATUS	DATA RATE	PAGE NO.
DMSP 50-2/57	SEE DMSP 50-2/F7							
DMSP 50-2/58	SEE DMSP 50-2/F8							
DMSP 50-2/59	SEE DMSP 50-2/F9							
DMSP BLOCK 50-1	SEE DMSP 50-1/F3							
DMSP BLOCK 50-1	SEE DMSP 50-1/F4							
DMSP BLOCK 50-1	SEE DMSP 50-1/F5							
DMSP BLOCK 50-2	SEE DMSP 50-2/F6							
DMSP BLOCK 50-2	SEE DMSP 50-2/F7							
DMSP BLOCK 50-2	SEE DMSP 50-2/F8							
DMSP BLOCK 50-2	SEE DMSP 50-2/F9							
DMSP BLOCK 50-2	SEE DMSP 50-2/F10							
DMSP-F10	SEE DMSP 50-2/F10							
DMSP-F3	SEE DMSP 50-1/F3							
DMSP-F4	SEE DMSP 50-1/F4							
DMSP-F5	SEE DMSP 50-1/F5							
DMSP-F6	SEE DMSP 50-2/F6							
DMSP-F7	SEE DMSP 50-2/F7							
DMSP-F8	SEE DMSP 50-2/F8							
DMSP-F9	SEE DMSP 50-2/F9							
DMSP501	SEE DMSP 50-1/F3							
DMSP501	SEE DMSP 50-1/F4							
DMSP501	SEE DMSP 50-1/F5							
DYNAMICS EXPLORER 1	UNITED STATES NASA-OSS 08/03/81 GEOCENTRIC			81-070A	08/03/81	NORMAL	STND	18
BURCH	HIGH ALTITUDE PLASMA INSTRUMENT			81-070A-05	08/16/81	NORMAL	STND	18
CHAPPELL	RETARDING ION MASS SPECTROMETER			81-070A-04	08/09/81	PARTIAL	STND	18
CORONITI	AURORAL PHYSICS			81-070A-07		NA	NA	19
FRANK	GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS			81-070A-03	09/14/81	NORMAL	STND	19
HELLIWELL	CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS			81-070A-08		NA	NA	19
SHAWMAN	PLASMA WAVES			81-070A-02	09/13/81	NORMAL	STND	19
SHELLEY	HOT PLASMA COMPOSITION			81-070A-06	08/13/81	NORMAL	STND	19
SUGIURA	MAGNETIC FIELD OBSERVATIONS			81-070A-01	08/24/81	NORMAL	STND	20
DYNAMICS EXPLORER 2	UNITED STATES NASA-OSS 08/03/81 GEOCENTRIC			81-070B	08/03/81	NORMAL	STND	20
BRACE	LANGMUIR PROBE			81-070B-09	08/05/81	NORMAL	STND	20
CARIGNAN	NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER			81-070B-03	08/02/81	NORMAL	STND	21
HANSON	RETARDING POTENTIAL ANALYZER			81-070B-07	08/06/81	NORMAL	STND	21
HAYS	FABRY-PEROT INTERFEROMETER			81-070B-05	08/09/81	NORMAL	STND	21
HEELIS	ION DRIFT METER			81-070B-06	08/06/81	NORMAL	STND	21
HOFFMAN	LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION			81-070B-13		NA	NA	22
MAYNARD	ELECTRIC FIELD INVESTIGATIONS			81-070B-02	08/10/81	PARTIAL	STND	22
MAYR	ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION			81-070B-12		NA	NA	22
MAGY	MAGNETOSPHERIC ENERGY COUPLING TO THE ATMOSPHERE INVESTIGATION			81-070B-10		NA	NA	22
ROBLE	NEUTRAL-PLASMA INTERACTIONS INVESTIGATION			81-070B-11		NA	NA	22
SPENCER	WIND AND TEMPERATURE SPECTROMETER			81-070B-04	08/04/81	NORMAL	STND	22
SUGIURA	MAGNETIC FIELD OBSERVATIONS			81-070B-01	08/11/81	NORMAL	STND	23
WINNINGHAM	LOW ALTITUDE PLASMA INSTRUMENT			81-070B-08	08/15/81	NORMAL	STND	23
DYNAMICS EXPLORER-A	SEE DYNAMICS EXPLORER 1							
DYNAMICS EXPLORER-B	SEE DYNAMICS EXPLORER 2							
EARTH RAD BUDGET SAT	SEE ERBS-A							
EARTH RES TECH SAT.-B	SEE LANDSAT 2							
EARTH RES TECH SAT.-C	SEE LANDSAT 3							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	-----CURRENT STATUS-----			
					EPOCH NRDDYY	STATUS	DATA RATE	PAGE NO.
EINSTEIN	SEE NEAO 2							
ERBS-A	UNITED STATES	NASA-OSTA 04/00/84	GEOCENTRIC	ERBS-A		APPROVED MISSION		110
BARKSTROM	EARTH RADIATION BUDGET EXPERIMENT (ERBE)			ERBS-A -01				110
MCCORMICK	STRATOSPHERIC AEROSOL AND GAS (SAGE)			ERBS-A -02				110
RUSSELL, JR	HALOGEN OCCULTATION (HALOE)			ERBS-A -03				110
ERTS-B	SEE LANDSAT 2							
ERTS-C	SEE LANDSAT 3							
ESA-GEOS 2	INTERNATIONAL	ESA 07/14/78	GEOCENTRIC	78-071A	08/01/78	NORMAL	STND	23
REGHIN	WAVE FIELD IMPEDANCE			78-071A-11	02/01/81	NORMAL	STND	23
GEISS	LOW-ENERGY ION COMPOSITION			78-071A-03	02/01/81	NORMAL	STND	24
GENDRIN	MAGNETIC WAVE FIELDS			78-071A-06	02/01/81	NORMAL	STND	24
MULTQVIST	LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION			78-071A-04	02/01/81	NORMAL	STND	24
MARIANI	TRIAXIAL FLUXGATE MAGNETOMETER			78-071A-09	02/01/81	NORMAL	STND	24
MELZNER	DC ELECTRIC FIELD AND GRADIENT D ELECTRON BEAM DEFLECTION			78-071A-08	02/01/81	NORMAL	STND	25
PEDERSEN	DC FIELDS BY DOUBLE PROBE			78-071A-07	02/01/81	NORMAL	STND	25
PETIT	VLF PLASMA RESONANCES			78-071A-05	02/01/81	NORMAL	STND	25
UNGSTRUP	ELECTRIC WAVE FIELDS			78-071A-10	02/01/81	NORMAL	STND	25
WILKEN	ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION			78-071A-01	02/01/81	NORMAL	STND	25
WRENN	THERMAL PLASMA FLOW			78-071A-02	02/01/81	NORMAL	STND	26
EUROPEAN X-RAY OBS SAT.	SEE EXOSAT							
EUVE	UNITED STATES	NASA-OSS 12/03/85	GEOCENTRIC	EUVE		APPROVED MISSION		111
BOWYER	EXTREME ULTRAVIOLET FULL-SKY SURVEY			EUVE -01				111
EXOS-B	SEE JIKIKEN							
EXOS-C	JAPAN	ISAS 02/00/84	GEOCENTRIC	EXOS-C		APPROVED MISSION		111
DOKE	MONITOR OF HIGH ENERGY PARTICLES			EXOS-C -08				111
MAKINO	LIMB SCANNING IR RADIOMETER			EXOS-C -01				111
MUKAI	PRECIPITATING PARTICLE ENERGY ANALYZER			EXOS-C -04				112
NAKAMURA	INFRARED SOLAR SPECTROMETER			EXOS-C -03				112
OGAWA	ULTRAVIOLET SPECTROMETER			EXOS-C -02				112
OYA	TOPSIDE PLASMA SOUNDER			EXOS-C -06				112
TAKAGI	SOLAR IMAGE-RADIOMETER			EXOS-C -05				112
TAKAHASHI	PLASMA PROBES			EXOS-C -07				112
EXOSAT	INTERNATIONAL	ESA 07/09/82	GEOCENTRIC	EXOSAT		APPROVED MISSION		112
BOYD	LOW-ENERGY X-RAY IMAGING TELESCOPES			EXOSAT -02				113
TAYLOR	GAS SCINTILLATION X-RAY SPECTROMETER			EXOSAT -03				113
TRUMPER	MEDIUM-ENERGY COSMIC X-RAY PACKAGE			EXOSAT -01				113
EXOSPHERIC SAT. B	SEE JIKIKEN							
EXOSPHERIC SAT. C	SEE EXOS-C							
EXPLORER 50	SEE IMP-J							
EXPLORER 55	SEE AE-E							
EXTREME UV EXPLORER	SEE EUVE							
GALILEO	SEE GALILEO PROBE							
GALILEO	SEE GALILEO ORBITER							
GALILEO ORBITER	UNITED STATES	NASA-OSS 03/26/85	JUPITER ORBITER	JOPO		APPROVED MISSION		113
ANDERSON	RADIO SCIENCE			JOPO -11				113
BELTON	ORBITER IMAGING			JOPO -10				113
CARLSON	NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER			JOPO -01				114
PANALE	FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES			JOPO -12				114
FRANK	PLASMA			JOPO -04				114
GIERASCH	JOVIAN ATMOSPHERIC DYNAMICS			JOPO -13				114
GRARD	ELECTRON ERITTER			JOPO -05				114
GRUN	DUST			JOPO -09				115
GURNETT	PLASMA WAVE SPECTROMETER			JOPO -07				115
HORD	ULTRAVIOLET SPECTROMETER (UVS)			JOPO -02				115
HUNTEN	STRUCTURE AND AERONOMY OF THE ATMOSPHERES OF JUPITER AND ITS SATELLITES			JOPO -14				115
KIVELSON	MAGNETOMETER			JOPO -03				115
LACIS	PHOTOPOLARIMETER RADIOMETER			JOPO -08				115
MASUNSKY	GEOLOGY OF THE GALILEAN SATELLITES			JOPO -15				116
MCELROY	INVESTIGATION OF THE JOVIAN UPPER ATMOSPHERE AND OF SATELLITE ATMOSPHERES			JOPO -16				116
ORTON	GROUND-TRUTH ANALYSIS OF RADIATIVE TRANSFER IN THE ATMOSPHERE OF JUPITER			JOPO -17				116

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	-----CURRENT STATUS-----				
				MSDC ID	EPOCH RABBY	STATUS	DATA RATE	PAGE NO.
OWEN	COMPOSITION OF THE JOVIAN ATMOSPHERE			JOP0	-18			116
POLLACK	THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE			JOP0	-19			116
RUSSELL	JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS			JOP0	-20			116
SAGAN	ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE			JOP0	-21			116
SCARF	WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER			JOP0	-22			116
SCHUBERT	JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION			JOP0	-23			117
SONETT	INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES+JOVIAN MAGNETOSPHERE			JOP0	-24			117
WILLIAMS	ENERGETIC PARTICLES			JOP0	-26			117
GALILEO PROBE	UNITED STATES NASA-OSS 03/26/85 JUPITER PROBE			JOP		APPROVED MISSION		117
BOESE	NET FLUX RADIOMETER			JOP	-04			117
LANZEROTTI	LIGHTNING			JOP	-06			117
NIEMANN	MASS SPECTROMETER			JOP	-03			118
RAGENT	NEPHELOMETER			JOP	-05			118
SIEFF	ATMOSPHERIC STRUCTURE			JOP	-02			118
VON ZAHN	HELIUM ABUNDANCE INTERFEROMETER			JOP	-01			118
GAMMA-RAY OBSERVATORY	UNITED STATES NASA-OSS 01/01/88 GEOCENTRIC			GRO		APPROVED MISSION		118
FICHTEL	HIGH-ENERGY GAMMA-RAY TELESCOPE			GRO	-04			118
FISHMAN	TRANSIENT-EVENT MONITOR			GRO	-05			119
KURFESS	SCINTILLATION SPECTROMETER			GRO	-02			119
SCHONFELDER	IMAGING COMPTON TELESCOPE			GRO	-03			119
GEODETIC SATELLITE-C	SEE GEOS 3							
GEOS 3	UNITED STATES NASA-OSTA 04/09/75 GEOCENTRIC			75-027A	04/09/75	NORMAL	STND	26
ANDERLE	US NAVY DOPPLER SYSTEM			75-027A-05	04/09/75	NORMAL	STND	26
GALICINAO	SATELLITE-TO-SATELLITE TRACKING			75-027A-06	12/11/70	INOPERABLE	ZERO	26
JACKSON	C-BAND SYSTEM			75-027A-03	11/01/78	PARTIAL	SUBS	26
PURDY	RADAR ALTIMETER SYSTEM			75-027A-01	12/01/78	PARTIAL	ZERO	27
SALZBERG	S-BAND TRACKING SYSTEM			75-027A-02	12/01/78	NORMAL	UNKN	27
STEPHANIDES	LASER TRACKING REFLECTOR			75-027A-04	04/09/75	NORMAL	STND	27
GEOS-C	SEE GEOS 3							
GEOSTATION.METEORO.SAT.2	SEE GMS-2							
GEOSTATION.METEOROL.SAT.	SEE GMS							
GIOTTO	INTERNATIONAL ESA 07/15/85 HELIOCENTRIC			GIOTTO		APPROVED MISSION		119
BALSIGER	ION MASS SPECTROMETER (IMS)			GIOTTO -03				120
JOHNSTONE	FAST IMPLANTED ION SENSOR (JPA)			GIOTTO -05				120
KELLER	HALLEY NUCLEUS IMAGING (HNC)			GIOTTO -01				120
KISSEL	DUST IMPACT MASS SPECTROMETER (PIA)			GIOTTO -04				120
KRANKOWSKY	NEUTRAL MASS SPECTROMETER (NMS)			GIOTTO -02				120
LEVASSEUR-REGOUB	HALLEY OPTICAL PROBE (HOPE)			GIOTTO -09				120
MCDONNELL	DUST IMPACT DETECTOR (DID)			GIOTTO -08				120
MCKENNA-LAWLOR	ENERGETIC PARTICLES (EPA)			GIOTTO -10				120
NEURAUER	MAGNETOMETER (MAG)			GIOTTO -07				120
REME	ELECTRON ESA AND POSITIVE ION CLUSTER COMPOSITION ANALYZER (RPA)			GIOTTO -06				121
GLOBAL MAGNETIC SURV MSN	SEE MAGSAT							
GMS	JAPAN NASDA 07/14/77 GEOCENTRIC			77-065A	08/15/77	NORMAL	STND	27
JMA STAFF	UNITED STATES NASA-OSTA			77-065A-01	08/15/77	NORMAL	STND	27
JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			77-065A-03	08/15/77	NORMAL	STND	28
KOHNO	WEATHER COMMUNICATIONS FACILITY SPACE ENVIRONMENT MONITOR (SEM)			77-065A-02	08/15/77	NORMAL	STND	28
GMS-2	JAPAN NASDA 08/10/81 GEOCENTRIC			81-076A	08/11/81	NORMAL	STND	28
JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			81-076A-01	08/11/81	NORMAL	STND	28
JMA STAFF	WEATHER COMMUNICATIONS FACILITY SPACE ENVIRONMENT MONITOR (SEM)			81-076A-03	08/11/81	NORMAL	STND	28
KOHNO				81-076A-02	08/11/81	NORMAL	STND	28
GOES 1	UNITED STATES NOAA-NESS 10/16/75 GEOCENTRIC			75-100A	06/18/80	NORMAL	ZERO	28
NESS STAFF	UNITED STATES NASA-OSTA			75-100A-01	06/18/80	PARTIAL	ZERO	29
NESS STAFF	VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-100A-05	11/30/79	NORMAL	ZERO	29
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-100A-02	06/01/78	PARTIAL	ZERO	29
WILLIAMS	ENERGETIC PARTICLE MONITOR			75-100A-03	06/01/78	NORMAL	ZERO	29
WILLIAMS	SOLAR X-RAY MONITOR			75-100A-04	06/18/80	NORMAL	ZERO	29
WILLIAMS	MAGNETIC FIELD MONITOR							
GOES 2	UNITED STATES NOAA-NESS 06/16/77 GEOCENTRIC			77-048A	06/16/77	NORMAL	STND	29
NESS STAFF	UNITED STATES NASA-OSTA			77-048A-05	10/04/79	NORMAL	STND	30
	METEOROLOGICAL DATA COLLECTION AND							

**INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR**

SPACECRAFT NAME		COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	NSRDC ID	EPOCH HADDT	STATUS	DATA RATE	PAGE NO.	
PRINC. INVEST. NAME		EXPERIMENT NAME								
GOES 3	WILLIAMS	TRANSMISSION SYSTEM			77-040A-02	07/20/77	NORMAL	STND	30	
	WILLIAMS	ENERGETIC PARTICLE MONITOR			77-040A-03	07/20/77	NORMAL	STND	30	
	WILLIAMS	SOLAR X-RAY MONITOR			77-040A-04	08/17/77	NORMAL	STND	30	
	WILLIAMS	MAGNETIC FIELD MONITOR								
GOES 3	NESS STAFF	UNITED STATES	NOAA-NESS	06/16/78	GEOCENTRIC	78-062A	06/14/79	NORMAL	STND	30
	NESS STAFF	UNITED STATES	NASA-OSTA			78-062A-01	07/13/78	NORMAL	STND	31
	NESS STAFF	VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)			78-062A-05	07/13/78	NORMAL	STND	31	
	WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			78-062A-02	07/13/78	NORMAL	STND	31	
	WILLIAMS	ENERGETIC PARTICLE MONITOR			78-062A-03	07/13/78	NORMAL	STND	31	
	WILLIAMS	SOLAR X-RAY MONITOR			78-062A-04	07/13/78	NORMAL	STND	31	
	WILLIAMS	MAGNETIC FIELD MONITOR								
	WILLIAMS									
GOES 4	NESS STAFF	UNITED STATES	NOAA-NESS	09/09/80	GEOCENTRIC	80-074A	09/10/80	NORMAL	STND	31
	NESS STAFF	UNITED STATES	NASA-OSTA			80-074A-01	09/27/80	NORMAL	STND	32
	NESS STAFF	VISIBLE INFRARED SPIN-SCAN RADIOMETER			80-074A-05	09/27/80	NORMAL	STND	32	
	WILLIAMS	ATMOSPHERIC SOUNDER (VAS)			80-074A-02	06/10/81	PARTIAL	SUMS	32	
	WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			80-074A-03	09/10/80	NORMAL	STND	32	
	WILLIAMS	ENERGETIC PARTICLE MONITOR			80-074A-04	09/10/80	NORMAL	STND	32	
	WILLIAMS	SOLAR X-RAY MONITOR								
	WILLIAMS	MAGNETIC FIELD MONITOR								
GOES 5	NESS STAFF	UNITED STATES	NOAA-NESS	05/22/81	GEOCENTRIC	81-049A	05/22/81	NORMAL	ZERO	33
	NESS STAFF	UNITED STATES	NASA-OSTA			81-049A-01	06/08/81	NORMAL	ZERO	33
	NESS STAFF	VISIBLE INFRARED SPIN-SCAN RADIOMETER			81-049A-05	06/08/81	NORMAL	ZERO	33	
	WILLIAMS	ATMOSPHERIC SOUNDER (VAS)			81-049A-02	05/23/81	NORMAL	ZERO	33	
	WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			81-049A-03	06/08/81	NORMAL	ZERO	34	
	WILLIAMS	ENERGETIC PARTICLE MONITOR			81-049A-04	05/23/81	NORMAL	ZERO	34	
	WILLIAMS	SOLAR X-RAY MONITOR								
	WILLIAMS	MAGNETIC FIELD MONITOR								
GOES-A	SEE GOES 1									
GOES-B	SEE GOES 2									
GOES-C	SEE GOES 3									
GOES-D	SEE GOES 4									
GOES-E	SEE GOES 5									
GOES-F	NESS STAFF	UNITED STATES	NOAA-NESS	12/02/82	GEOCENTRIC	GOES-F	APPROVED MISSION		121	
	NESS STAFF	UNITED STATES	NASA-OSTA			GOES-F -01			121	
	NESS STAFF	VISIBLE INFRARED SPIN-SCAN RADIOMETER			GOES-F -05				121	
	WILLIAMS	ATMOSPHERIC SOUNDER (VAS)			GOES-F -02				121	
	WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM			GOES-F -03				122	
	WILLIAMS	ENERGETIC PARTICLE MONITOR			GOES-F -04				122	
	WILLIAMS	SOLAR X-RAY MONITOR								
	WILLIAMS	MAGNETIC FIELD MONITOR								
GOES-I	SEE GOES 1									
MAKUCHO	MAKINO	JAPAN	ISAS	02/21/79	GEOCENTRIC	79-014A	02/21/79	NORMAL	STND	34
	MAKINO	DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES			79-014A-02	03/08/79	NORMAL	STND	34	
	MIYAMOTO	MONITOR OF X-RAY SOURCES			79-014A-01	03/08/79	NORMAL	STND	34	
	MIYAMOTO									
MCM	BARNES	UNITED STATES	NASA-OSTA	04/26/78	GEOCENTRIC	78-041A	04/26/78	NORMAL	STND	34
	BARNES	HEAT CAPACITY MAPPING RADIOMETER			78-041A-01	09/30/80	INOPERABLE	ZERO	34	
HEAD 2	GIACCONI	UNITED STATES	NASA-OSS	11/13/78	GEOCENTRIC	78-103A	04/25/81	INOPERABLE	ZERO	35
	GIACCONI	MONITOR PROPORTIONAL COUNTER (MPC)			78-103A-01	04/25/81	INOPERABLE	ZERO	35	
	GIACCONI	HIGH-RESOLUTION IMAGER (HRI)			78-103A-02	04/25/81	INOPERABLE	ZERO	35	
	GIACCONI	FOCAL PLANE CRYSTAL SPECTROMETER (FPCS)			78-103A-03	04/25/81	INOPERABLE	ZERO	35	
	GIACCONI	IMAGING PROPORTIONAL COUNTER (IPC)			78-103A-04	04/25/81	INOPERABLE	ZERO	35	
	GIACCONI									
HEAD 3	ISRAEL	UNITED STATES	NASA-OSS	09/28/79	GEOCENTRIC	79-082A	05/30/81	INOPERABLE	ZERO	36
	JACOBSON	HEAVY NUCLEI			79-082A-03	05/30/81	INOPERABLE	ZERO	36	
	KOCH	GAMMA-RAY LINE SPECTROMETER			79-082A-01	05/30/81	INOPERABLE	ZERO	36	
	KOCH	ISOTOPIC COMPOSITION OF COSMIC RAYS			79-082A-04	05/30/81	INOPERABLE	ZERO	36	
HEAD-B	SEE HEAD 2									
HEAT CAPACITY MAP MSB	SEE MCM									
HELIOCENTRIC	SEE ISEE 3									
HELIOS 1	SEE HELIOS-A									
HELIOS-A	FECHTIG	FED REP OF GERMANY	DMWF	12/10/74	HELIOCENTRIC	74-097A	12/10/74	NORMAL	STND	36
	FECHTIG	UNITED STATES	NASA-OSS			74-097A-12	12/10/74	NORMAL	STND	37
		MICROMETEOROID DETECTOR AND ANALYZER								

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAME AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *****PRINC. INVEST. NAME*****	COUNTRY AND AGENCY *****EXPERIMENT NAME*****	LAUNCH DATE	ORBIT TYPE	SSDC ID	-----CURRENT STATUS----- EPOCH WDDVVY	STATUS	DATA RATE	PAGE NO.
GURNETT GURNETT	SOLAR WIND PLASMA WAVE FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS			74-097A-04 74-097A-05	03/10/75 03/10/75	PARTIAL PARTIAL	STND STND	37 37
GURNETT KEPPLER KUNDT KUNDT LEINERT NESS NEUBAUER	26.5-KHZ TO 3-KHZ RADIO WAVE ENERGETIC ELECTRON AND PHOTON DETECTOR CELESTIAL MECHANICS COSMIC-RAY PARTICLES ZODIACAL LIGHT PHOTOMETER FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS			74-097A-06 74-097A-10 74-097A-14 74-097A-07 74-097A-11 74-097A-02 74-097A-01	03/10/75 12/10/74 12/10/74 12/10/74 12/10/74 12/10/74 12/10/74	PARTIAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL	STND STND STND STND STND STND STND	37 38 38 38 38 38 38
NEUBAUER ROSENBAUER TRAINOR	SEARCH COIL MAGNETOMETER PLASMA DETECTORS GALACTIC AND SOLAR COSMIC RAYS			74-097A-03 74-097A-09 74-097A-08	12/10/74 12/10/74 12/10/74	NORMAL NORMAL NORMAL	STND STND STND	38 39 39
HELOS	SEE EROSAT							
HI-ECCEN LUN OCCULT.SAT.	SEE EROSAT							
HIGH ENERGY ASTRON OBS-B	SEE HEAO 2							
HIGH ENERGY ASTRON OBS3	SEE HEAO 3							
HINOTORI	JAPAN	ISAS	02/21/81 GEOCENTRIC	81-017A	02/21/81	NORMAL	STND	39
MIRAO KONDO	PLASMA PROBES SOLAR FLARE GAMMA-RAY DETECTOR IN 0.2-9.0 MEV RANGE			81-017A-06 81-017A-04				39 39
MATSUOKA	TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-20 KEV RANGE			81-017A-03				39
NISHI	SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.7-2.0 A RANGE			81-017A-02				40
TAKAKURA	SOLAR FLARE 10-40 KEV X RAYS USING ROTATING MODULATION COLLIMATOR IMAGING			81-017A-01				40
TAKEUCHI	ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR			81-017A-05				40
HIPPARCOS	INTERNATIONAL	ESA	12/08/85 GEOCENTRIC	HIPPA		APPROVED MISSION		122
IME-B	SEE ISEE 2							
IME-H	SEE ISEE 3							
IMP B	SEE IMP-J							
IMP-J	UNITED STATES	NASA-OSS	10/26/73 GEOCENTRIC	73-078A	10/26/73	NORMAL	STND	40
AGGSON BAME BRIDGE FRANK	ELECTROSTATIC FIELDS SOLAR PLASMA ELECTROSTATIC ANALYZER SOLAR PLASMA PARADAY CUP MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			73-078A-11 73-078A-10 73-078A-02 73-078A-04	10/26/73 10/26/73 10/26/73 10/26/73	NORMAL NORMAL NORMAL NORMAL	STND STND STND STND	40 40 40 41
GLOECKLER GURNETT KRIMIGIS	SOLID-STATE DETECTORS ELECTROSTATIC WAVES AND RADIO NOISE CHARGED PARTICLE MEASUREMENTS EXPERIMENT			73-078A-03 73-078A-12 73-078A-08	12/15/78 10/26/73 11/05/73	PARTIAL NORMAL NORMAL	STND STND STND	41 41 41
MCDONALD NESS SIMPSON	SOLAR AND COSMIC-RAY PARTICLES MAGNETIC FIELD EXPERIMENT SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE			73-078A-09 73-078A-01 73-078A-07	10/26/73 10/26/73 10/26/73	NORMAL NORMAL NORMAL	STND STND STND	41 41 42
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPE			73-078A-06	10/26/73	NORMAL	STND	42
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			73-078A-05	10/26/73	NORMAL	STND	42
IMP-K	SEE ISEE 1							
IMP-K PRIME	SEE ISEE 2							
INDIAN NATIONAL SAT.	SEE INSAT-1A							
INDIAN NATIONAL SAT.	SEE INSAT-1B							
INFRA-RED ASTRONOM SAT	SEE IR ASTRON. SAT.							
INSAT-1A	INDIA	ISRO	02/18/82 GEOCENTRIC	INSAT-1		APPROVED MISSION		122
INSAT-1B	INDIA	ISRO	1983 GEOCENTRIC	INSAT1B		APPROVED MISSION		122
INT SOLAR POLAR	SEE ISPM/ESA							
INT SOLAR POLAR	SEE ISPM/NASA							
INT ULTRAVIOLET EXPL	SEE IUE							
INTERCOSMOS 18	U.S.S.R.	INTERCOS	10/24/78 GEOCENTRIC	78-009A	03/17/81	INOPERABLE	ZERO	42
INTERCOSMOS 19	U.S.S.R.	INTERCOS	02/27/79 GEOCENTRIC	79-028A	02/27/79	NORMAL	STND	42

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	SSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
*PRINC. INVEST. NAME	EXPERIMENT NAME							
INTNL SUN EARTH EXPL-A	SEE ISEE 1							
INTNL SUN EARTH EXPL-C	SEE ISEE 3							
ION RELEASE MODULE	SEE IRM							
IONO-IX	SEE INTERCOSMOS 19							
IONCOSONDE-IX	SEE INTERCOSMOS 19							
IONOSP SOUNDING SAT 2	SEE ISS-B							
IR ASTRON. SAT.	THE NETHERLANDS UNITED STATES UNITED KINGDOM	NIVR NASA-OSS SRC	08/19/82 GEOCENTRIC	IRAS		APPROVED MISSION		123
IRAS	SEE IR ASTRON. SAT.							
IRM	UNITED STATES FED REP OF GERMANY LI AND BA RELEASE MODULE	NASA-OSS MPI	08/01/84 GEOCENTRIC	IRM		APPROVED MISSION		123
HAERENDEL				IRM -01				123
ISEE 1	UNITED STATES	NASA-OSS	10/22/77 GEOCENTRIC	77-102A	10/22/77	NORMAL	STND	43
ANDERSON	ELECTRONS AND PROTONS			77-102A-10	10/22/77	NORMAL	STND	43
BAME	FAST PLASMA AND SOLAR WIND IONS			77-102A-01	01/08/79	PARTIAL	STND	43
CLINE	GAMMA-RAY BURSTS			77-102A-14	10/22/77	NORMAL	STND	43
FRANK	HOT PLASMA			77-102A-03	10/22/77	NORMAL	STND	43
GURNETT	PLASMA WAVES			77-102A-07	10/22/77	NORMAL	STND	44
HARVEY	PLASMA DENSITY			77-102A-08	10/22/77	NORMAL	STND	44
HELLIWELL	VLF WAVE PROPAGATION			77-102A-13	10/22/77	NORMAL	STND	44
HEPPNER	DC ELECTRIC FIELD			77-102A-11	10/22/77	NORMAL	STND	44
HOVESTADT	LOW-ENERGY COSMIC RAYS			77-102A-05	08/07/78	PARTIAL	STND	44
MOZER	QUASI-STATIC ELECTRIC FIELDS			77-102A-06	10/22/77	NORMAL	STND	45
OGILVIE	FAST ELECTRONS			77-102A-02	10/22/77	NORMAL	STND	45
RUSSELL	FLUXGATE MAGNETOMETER			77-102A-04	10/22/77	NORMAL	STND	45
SHARP	ION COMPOSITION			77-102A-12	04/13/78	PARTIAL	STND	45
ISEE 2	INTERNATIONAL UNITED STATES	ESA NASA-OSS	10/22/77 GEOCENTRIC	77-102B	10/22/77	NORMAL	STND	45
ANDERSON	ELECTRONS AND PROTONS			77-102B-08	05/01/79	PARTIAL	STND	45
EGIDI	SOLAR WIND IONS			77-102B-02	10/22/77	NORMAL	STND	46
FRANK	HOT PLASMA			77-102B-03	01/10/78	PARTIAL	STND	46
GURNETT	PLASMA WAVES			77-102B-05	10/22/77	NORMAL	STND	46
HARVEY	RADIO PROPAGATION			77-102B-06	10/22/77	NORMAL	STND	46
RUSSELL	FLUXGATE MAGNETOMETER			77-102B-04	10/22/77	NORMAL	STND	46
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			77-102B-07	10/22/77	NORMAL	STND	47
ISEE 3	UNITED STATES	NASA-OSS	08/12/78 HELIOCENTRIC	78-079A	08/12/78	NORMAL	STND	47
ANDERSON	INTERPLANETARY AND SOLAR ELECTRONS			78-079A-09	11/22/79	INOPERABLE	ZERO	47
ANDERSON	X- AND GAMMA-RAY BURSTS			78-079A-14	08/15/78	NORMAL	STND	47
BAME	SOLAR WIND PLASMA			78-079A-01	03/19/80	PARTIAL	STND	47
HECKMAN	HIGH-ENERGY COSMIC RAY			78-079A-05	04/04/81	PARTIAL	STND	47
HOVESTADT	LOW-ENERGY COSMIC RAYS			78-079A-03	08/15/78	NORMAL	STND	48
HYNDS	ENERGETIC PROTONS			78-079A-08	08/15/78	NORMAL	STND	48
MEYER	COSMIC-RAY ELECTRONS AND NUCLEI			78-079A-06	08/15/78	NORMAL	STND	48
OGILVIE	SOLAR WIND ION COMPOSITION			78-079A-11	08/18/78	NORMAL	STND	48
SCARF	PLASMA WAVES			78-079A-07	08/12/78	NORMAL	STND	48
SMITH	MAGNETIC FIELDS			78-079A-02	08/12/77	NORMAL	STND	48
STEINBERG	RADIO MAPPING			78-079A-10	08/13/78	NORMAL	STND	49
STONE	HIGH-ENERGY COSMIC RAYS			78-079A-12	01/15/79	PARTIAL	STND	49
TEE ARDEN	GAMMA-RAY BURSTS			78-079A-15	01/15/79	PARTIAL	STND	49
VON ROSENINGE	MEDIUM-ENERGY COSMIC RAY			78-079A-04	08/15/78	NORMAL	STND	49
WILCOX	GROUND BASED SOLAR STUDIES			78-079A-13	NA	NA	NA	49
ISEE-A	SEE ISEE 1							
ISEE-B	SEE ISEE 2							
ISEE-C	SEE ISEE 3							
ISIS 1	CANADA UNITED STATES	CRC NASA-OSS	01/30/69 GEOCENTRIC	69-009A	01/30/70	PARTIAL	SUBS	49
BARRINGTON	VLF RECEIVER			69-009A-03	01/30/70	NORMAL	SUBS	50
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			69-009A-07	01/30/70	NORMAL	SUBS	50
CALVERT	FIXED-FREQUENCY SOUNDER			69-009A-02	01/30/70	NORMAL	SUBS	50
HARTZ	COSMIC RADIO NOISE			69-009A-10	01/30/70	NORMAL	SUBS	50
MCDIARMID	ENERGETIC PARTICLE DETECTORS			69-009A-04	01/30/70	NORMAL	SUBS	50
SAGALYN	SPHERICAL ELECTROSTATIC ANALYZER			69-009A-08	01/30/70	NORMAL	SUBS	51
WHITTAKER	SWEEP-FREQUENCY SOUNDER			69-009A-01	01/30/70	NORMAL	SUBS	51
ISIS 2	CANADA UNITED STATES	CRC NASA-OSS	04/01/71 GEOCENTRIC	71-024A	02/04/73	PARTIAL	SUBS	51
ANGER	3914- AND 5577-# PHOTOMETER			71-024A-11	02/04/73	NORMAL	SUBS	51
BARRINGTON	VLF RECEIVER			71-024A-03	02/04/73	NORMAL	SUBS	52
CALVERT	FIXED-FREQUENCY SOUNDER			71-024A-02	02/04/73	NORMAL	SUBS	52
HARTZ	COSMIC RADIO NOISE			71-024A-10	02/04/73	NORMAL	SUBS	52

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *****PRINC. INVEST. NAME*****	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	-----CURRENT STATUS-----				
				NSIDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
MAIER	RETARDING POTENTIAL ANALYZER			71-024A-00	02/04/73	NORMAL	SUBS	52
MCDIARMID	ENERGETIC PARTICLE DETECTORS			71-024A-04	02/04/73	PARTIAL	SUBS	52
SHEPHERD	6300-A PHOTOMETER			71-024A-12	02/04/73	NORMAL	SUBS	52
WHITTEKER	SWEEP-FREQUENCY SOUNDER			71-024A-01	02/04/73	NORMAL	SUBS	53
ISIS-A	SEE ISIS 1							
ISIS-B	SEE ISIS 2							
ISP	SEE ISPM/ESA							
ISP	SEE ISPM/NASA							
ISPM-A	SEE ISPM/NASA							
ISPM-B	SEE ISPM/ESA							
ISPM/ESA	INTERNATIONAL ESA	04/25/85	HELIOCENTRIC	ISPESA		APPROVED MISSION		123
DAWE	PLASMA SPECTROMETER			ISPESA -05				123
ESPOSITO	RADIO SCIENCE			ISPESA -09				124
GLUECKLER	SOLAR-WIND COMPOSITION SPECTROMETER			ISPESA -04				124
GRUM	COSMIC DUST			ISPESA -07				124
HEDGECOCK	MAGNETIC FIELD			ISPESA -08				124
HURLEY	SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST			ISPESA -01				124
LANZERGTTI	HELIOSPHERE			ISPESA -03				124
SIMPSON	COSMIC RAY AND CHARGED PARTICLE			ISPESA -02				125
STONE	UNIFIED RADIO AND PLASMA WAVE			ISPESA -06				125
ISPM/NASA	UNITED STATES NASA-OSS	03/27/85	HELIOCENTRIC	ISPNASA		UNDER STUDY		125
ACUNA	MAGNETIC FIELD (MAG)			ISPNASA-06				125
CLINE	SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SXR)			ISPNASA-02				125
GIESE	ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE)			ISPNASA-08				126
MACQUEEN	WHITE-LIGHT CORONAGRAPH/X-RAY XUV TELESCOPE (CXU)			ISPNASA-01				126
ROSENBAUER	MASS SEPARATING SOLAR WIND (SWE)			ISPNASA-04				126
ROSENBAUER	DIRECT MEASUREMENT OF INTERSTELLAR GAS USING HE AS TRACER (NGW)			ISPNASA-07				126
STONE	COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA)			ISPNASA-03				126
STONE	ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (RAE)			ISPNASA-05				126
ISS-2	SEE ISS-B							
ISS-B	JAPAN RRL	02/16/78	GEOCENTRIC	78-018A	02/16/78	NORMAL	STND	53
AIKYO	SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)			78-018A-01	02/27/78	NORMAL	SUBS	53
IWAMOTO	ION MASS SPECTROMETER			78-018A-04	02/27/78	NORMAL	SUBS	53
KOTAKI	RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ			78-018A-02	02/27/78	NORMAL	SUBS	53
MIYAZAKI	RETARDING POTENTIAL TRAP			78-018A-03	02/27/78	NORMAL	SUBS	54
IUE	UNITED STATES NASA-OSS	01/26/78	GEOCENTRIC	78-012A	01/26/78	NORMAL	STND	54
	INTERNATIONAL ESA							
	UNITED KINGDOM SRC							
GUEST INVESTIGATORS	LOW-/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE			78-012A-01	01/26/78	NORMAL	STND	54
NONE ASSIGNED	PARTICLE FLUX MONITOR (SPACECRAFT)			78-012A-02	01/26/78	NORMAL	STND	54
IKIKEN	JAPAN ISAS	09/16/78	GEOCENTRIC	78-007A	09/16/78	NORMAL	STND	54
EJINI	IMPEDANCE AND ELECTRIC FIELD (IEF)			78-007A-04	09/25/78	NORMAL	STND	55
KAWASHIMA	CONTROLLED ELECTRON BEAM EMISSIONS (CBE)			78-007A-07	09/23/78	NORMAL	STND	55
KIMURA	VLF DOPPLER PROPAGATION (DPL)			78-007A-03	09/23/78	NORMAL	STND	55
KURO	ENERGY SPECTRUM OF PARTICLES (ESP)			78-007A-06	09/23/78	NORMAL	STND	55
OYA	STIMULATED PLASMA WAVE (SPW)			78-007A-01	09/25/78	NORMAL	STND	55
OYA	NATURAL PLASMA WAVES (NPM)			78-007A-02	09/25/78	NORMAL	STND	55
JOP	SEE GALILEO PROBE							
JOP	SEE GALILEO ORBITER							
JUPITER ORBITER PROBE	SEE GALILEO PROBE							
JUPITER ORBITER PACBE	SEE GALILEO ORBITER							
LAND SATELLITE-E	SEE LANDSAT-01							
LANDSAT 2	UNITED STATES NASA-OSTA	01/22/75	GEOCENTRIC	75-004A	05/06/80	NORMAL	SUBS	56
BALLA	MULTISPECTRAL SCANNER (MSS)			75-004A-02	05/06/80	NORMAL	STND	56
LANDSAT 3	UNITED STATES NASA-OSTA	03/05/78	GEOCENTRIC	78-026A	03/05/78	NORMAL	STND	56
BALLA	MULTISPECTRAL SCANNER (MSS)			78-026A-02	03/19/80	PARTIAL	SUBS	56
GILBERT	DATA COLLECTION SYSTEM (DCS)			78-026A-03	03/05/78	NORMAL	STND	57
WEINSTEIN	RETURN BEAM VIDICON CAMERA (RBV)			78-026A-01	03/05/78	NORMAL	STND	57

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* SPACECRAFT NAME ***** *PRINC. INVEST. NAME *	COUNTRY AND AGENCY ***** EXPERIMENT NAME *	LAUNCH DATE *****	ORBIT TYPE *****	* NSSDC ID *****	-----CURRENT STATUS-----			
					EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
LANDSAT-C	SEE LANDSAT 3							
LANDSAT-D	UNITED STATES	NASA-OSTA 07/31/82	GEOCENTRIC	LAND-D		APPROVED MISSION		126
BANKS	MULTISPECTRAL SCANNER (MSS)			LAND-D -02				127
FEINBERG	GLOBAL POSITIONING SYSTEM (GPS)			LAND-D -03				127
WEINSTEIN	THEMATIC MAPPER			LAND-D -01				127
LANDSAT-D1	UNITED STATES	NASA-OSTA 06/08/85	GEOCENTRIC	LAND-E		APPROVED MISSION		127
BANKS	MULTISPECTRAL SCANNER (MSS)			LAND-E -02				128
FEINBERG	GLOBAL POSITIONING SYSTEM (GPS)			LAND-E -03				128
WEINSTEIN	THEMATIC MAPPER			LAND-E -01				128
L	SPACE TELESCOPE	SEE ST						
LDEF	SEE SPACE SHUTTLE LDEF-A							
LFO-A	SEE LANDSAT-D							
LONG DURATION EXPOS.FAC.	SEE SPACE SHUTTLE LDEF-A							
MAG-1K	SEE INTERCOSMOS 18							
MAGIC	SEE INTERCOSMOS 18							
MAGION	U.S.S.R.	INTERCOS 10/24/78	GEOCENTRIC	78-099C	11/14/78	NORMAL	STND	57
TRISKA	CZECHOSLOVAKIA	CAS		78-099C-01				57
TRISKA	ELF AND VLF RECEIVERS ENERGETIC PARTICLE DETECTORS			78-099C-02				57
MAGSAT	UNITED STATES	NASA-OSTA 10/30/79	GEOCENTRIC	79-094A	06/11/80	INOPERABLE	ZERO	58
LANGE	SCALAR MAGNETOMETER			79-094A-01	06/11/80	INOPERABLE	ZERO	58
LANGE	VECTOR MAGNETOMETER			79-094A-02	06/11/80	INOPERABLE	ZERO	58
MAGSAT-A	SEE MAGSAT							
MARINER 77A	SEE VOYAGER 1							
MARINER 77B	SEE VOYAGER 2							
MARINER JUPITER/SATURN A	SEE VOYAGER 1							
MARINER JUPITER/SATURN B	SEE VOYAGER 2							
ME01	SEE SMS 1							
ME02	SEE SMS 2							
METEOROLOGICAL SAT-A	SEE METEOSAT 1							
METEOROLOGICAL SAT-B	SEE METEOSAT 2							
METEOSAT 1	INTERNATIONAL	ESA 11/23/77	GEOCENTRIC	77-108A	11/24/79	PARTIAL	STND	58
DIETERLE	DATA COLLECTION PLATFORM (DCP)			77-108A-02	11/23/77	NORMAL	STND	58
METEOSAT 2	INTERNATIONAL	ESA 06/19/81	GEOCENTRIC	81-057A	07/02/81	NORMAL	ZERO	59
DIETERLE	DATA COLLECTION PLATFORM (DCP)			81-057A-02	07/02/81	UNKNOWN	ZERO	59
REYNOLDS	IMAGING RADIOMETER			81-057A-01	07/02/81	UNKNOWN	ZERO	59
METEOSAT-B	SEE METEOSAT 2							
MJS 77A	SEE VOYAGER 1							
MJS 77B	SEE VOYAGER 2							
MOTHER	SEE ISEE 1							
NIMBUS 4	UNITED STATES	NASA-OSTA 04/08/78	GEOCENTRIC	78-025A	09/30/80	INOPERABLE	ZERO	59
HEATH	BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER			78-025A-05	09/30/80	INOPERABLE	ZERO	59
NIMBUS 5	UNITED STATES	NASA-OSTA 12/11/77	GEOCENTRIC	72-097A	01/04/73	PARTIAL	STND	60
HOUGHTON	SELECTIVE CHOPPER RADIOMETER (SCR)			72-097A-02	07/15/75	NORMAL	SUBS	60
WILHEIT, JR.	ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)			72-097A-04	08/15/77	PARTIAL	SUBS	60
NIMBUS 6	UNITED STATES	NASA-OSTA 06/12/75	GEOCENTRIC	75-052A	01/08/76	PARTIAL	STND	60
HOUGHTON	PRESSURE MODULATED RADIOMETER (PMR)			75-052A-09	03/02/81	PARTIAL	ZERO	61
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			75-052A-05	03/02/81	PARTIAL	ZERO	61
JULIAN	TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE)			75-052A-01	03/02/81	PARTIAL	SUBS	61
WILHEIT, JR.	ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)			75-052A-03	03/02/81	PARTIAL	ZERO	62
NIMBUS 7	UNITED STATES	NASA-OSTA 10/24/78	GEOCENTRIC	78-093A	10/24/78	NORMAL	STND	62
GLOERSEN	SCANNING MULTISPECTRAL MICROWAVE			78-093A-08	10/24/78	NORMAL	STND	62

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *****PRINC. INVEST. NAME*****	COUNTRY AND AGENCY *****EXPERIMENT NAME*****	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS----- EPOCH RBDT	STATUS	DATA RATE	PAGE NO.
MEATH	RADIOMETER (SMRR) SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)			78-098A-09	10/24/78	NORMAL	STND	62
HUGHTON	STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)			78-098A-02	11/15/78	NORMAL	STND	62
HOVIS	COASTAL ZONE COLOR SCANNER (CZCS)			78-098A-03	10/29/78	NORMAL	STND	63
HWANG	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)			78-098A-10	10/24/78	NORMAL	STND	63
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			78-098A-07	06/22/80	PARTIAL	STND	63
MCCORMICK	STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)			78-098A-06	10/24/78	NORMAL	STND	64
NIMBUS-D	SEE NIMBUS 4							
NIMBUS-E	SEE NIMBUS 5							
NIMBUS-F	SEE NIMBUS 6							
NIMBUS-G	SEE NIMBUS 7							
NOAA 6	UNITED STATES NOAA-NESS	06/27/79	GEOCENTRIC	79-057A	06/27/79	NORMAL	STND	64
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			79-057A-01	06/27/79	NORMAL	STND	64
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			79-057A-02	06/27/79	NORMAL	STND	64
NESS STAFF	DATA COLLECTION SYSTEM			79-057A-03	06/27/79	NORMAL	STND	64
WILLIAMS	SPACE ENVIRONMENT MONITOR			79-057A-04	06/27/79	NORMAL	STND	65
NOAA 7	UNITED STATES NOAA-NESS	06/23/81	GEOCENTRIC	81-059A	06/23/81	NORMAL	STND	65
NESS STAFF	UNITED STATES NASA-OSTA							
	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			81-059A-01	07/13/81	NORMAL	STND	65
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			81-059A-02	07/13/81	NORMAL	STND	65
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			81-059A-03	07/13/81	NORMAL	STND	65
WILLIAMS	SPACE ENVIRONMENT MONITOR			81-059A-04	07/13/81	NORMAL	STND	66
NOAA-A	SEE NOAA 6							
NOAA-C	SEE NOAA 7							
NOAA-D	UNITED STATES NOAA-NESS	09/15/81	GEOCENTRIC	NOAA-D		APPROVED MISSION		128
NESS STAFF	UNITED STATES NASA-OSTA			NOAA-D -01				128
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-D -02				129
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-D -03				129
WILLIAMS	DATA COLLECTION SYSTEM (DCS)			NOAA-D -04				129
	SPACE ENVIRONMENT MONITOR							
NOAA-E	UNITED STATES NOAA-NESS	04/15/83	GEOCENTRIC	NOAA-E		APPROVED MISSION		129
NESS STAFF	UNITED STATES NASA-OSTA			NOAA-E -01				129
	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-E -02				130
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-E -03				130
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-E -04				130
WILLIAMS	SPACE ENVIRONMENT MONITOR							
NOAA-F	UNITED STATES NOAA-NESS	09/15/83	GEOCENTRIC	NOAA-F		APPROVED MISSION		130
BROOME	UNITED STATES NASA-OSTA			NOAA-F -05				130
NESS STAFF	EARTH RADIATION BUDGET INSTRUMENT (ERBI)			NOAA-F -01				131
	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-F -02				131
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-F -03				131
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-F -04				131
WILLIAMS	SPACE ENVIRONMENT MONITOR							
NOAA-G	UNITED STATES NOAA-NESS	04/15/85	GEOCENTRIC	NOAA-G		APPROVED MISSION		131
BROOME	UNITED STATES NASA-OSTA			NOAA-G -05				132
NESS STAFF	EARTH RADIATION BUDGET INSTRUMENT (ERBI)			NCAA-G -01				132
	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-G -02				132
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-G -03				132
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-G -04				132
WILLIAMS	SPACE ENVIRONMENT MONITOR							
DAO 3	UNITED STATES NASA-OSS	08/21/72	GEOCENTRIC	72-065A	02/15/81	INOPERABLE	ZERO	66
BOYD	STELLAR X RAYS			72-065A-02	02/15/81	INOPERABLE	ZERO	66
SPITZER	HIGH-RESOLUTION TELESCOPES			72-065A-01	02/15/81	INOPERABLE	ZERO	66
DAO-C	SEE DAO 3							
OSS-1	UNITED STATES NASA-OSS	04/30/82	GEOCENTRIC	SHOFT-4		APPROVED MISSION		133
BANKS	VEHICLE CHARGING AND POTENTIAL EXPERIMENT			SHOFT-4-04				133
BRUECKNER	SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR			SHOFT-4-03				133
COWLES	INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS			SHOFT-4-07				133

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAME AND PRINCIPAL INVESTIGATOR

* SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	-----CURRENT STATUS-----			
*PRINC. INVEST. NAME	EXPERIMENT NAME				EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
MCDONNELL	MICROABR. SION FOIL			SHOFT-4-08				134
NOVICK	SOLAR FLARE X-RAY POLARIMETER EXPERIMENT			SHOFT-4-02				134
GLENDORF	THERMAL CANISTER EXPERIMENT			SHOFT-4-05				134
SHAWHAN	PLASMA DIAGNOSTIC PACKAGE			SHOFT-4-01				134
TRIOLO	CONTAMINATION MONITOR			SHOFT-4-09				134
WEINBERG	CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE			SHOFT-4-06				134
OSTA-1	UNITED STATES NASA-OSTA 10/30/81 GEOCENTRIC			OSTA-1		APPROVED MISSION		135
BROWN	REFLEX BIOENGINEERING TEST (HBT)			OSTA-1 -07				135
ELACHI	SHUTTLE IMAGING RADAR-A (SIR-A)			OSTA-1 -01				135
GEOTZ	SHUTTLE MULTISPECTRAL INFRARED RADIOMETER (SMIR)			OSTA-1 -02				135
KIM	OCEAN COLOR COCE			OSTA-1 -05				135
REICHEL, JR.	MEASUREMENT OF AIR POLLUTION FROM SATELLITES			OSTA-1 -04				136
SCHAPPELL	FEATURE IDENTIFICATION AND LOCATION (FILE)			OSTA-1 -03				136
VONNEGUT	NIGHT/DAY OPTICAL SURVEY OF LIGHTING			OSTA-1 -06				136
OUTER PLANETS A	SEE VOYAGER 1							
OUTER PLANETS B	SEE VOYAGER 2							
P78-1	SEE STP P78-1							
P78-2	SEE STP P78-2							
P80-1	SEE STP P80-1							
PIONEER 6	UNITED STATES NASA-OSS 12/16/65 HELIOCENTRIC			65-105A	02/07/71	NORMAL	SUBS	66
ANDERSON	CELESTIAL MECHANICS			65-105A-07	12/16/65	NORMAL	STND	67
ANDERSON	RELATIVITY INVESTIGATION			65-105A-10	12/16/65	NORMAL	STND	67
BRIDGE	SOLAR WIND PLASMA FARADAY CUP			65-105A-02	12/03/74	PARTIAL	SUBS	67
FAN	COSMIC-RAY TELESCOPE			65-105A-03	12/03/74	NORMAL	SUBS	67
GOLDSTEIN	SPECTRAL BROADENING			65-105A-09	12/16/65	NORMAL	STND	67
MCKACKEN	COSMIC-RAY ANISOTROPY			65-105A-05	12/03/74	PARTIAL	SUBS	67
WOLFE	ELECTROSTATIC ANALYZER			65-105A-06	12/03/74	NORMAL	SUBS	68
PIONEER 9	UNITED STATES NASA-OSS 11/08/68 HELIOCENTRIC			68-100A	05/19/69	NORMAL	SUBS	68
ANDERSON	CELESTIAL MECHANICS			68-100A-08	11/08/68	NORMAL	STND	68
BERG	COSMIC DUST DETECTOR			68-100A-04	05/19/69	NORMAL	SUBS	68
ESHELMAN	TWO-FREQUENCY BEACON RECEIVER			68-100A-03	12/03/74	NORMAL	SUBS	69
MCCRACKEN	COSMIC-RAY ANISOTROPY			68-100A-05	05/19/69	NORMAL	SUBS	69
SCARF	PLASMA WAVE DETECTOR			68-100A-07	05/19/69	NORMAL	SUBS	69
SONETT	TRIAXIAL MAGNETOMETER			68-100A-01	05/19/69	NORMAL	SUBS	69
WEBBER	COSMIC-RAY TELESCOPE			68-100A-06	05/19/69	NORMAL	SUBS	69
WOLFE	ELECTROSTATIC ANALYZER			68-100A-02	12/03/74	NORMAL	SUBS	70
PIONEER 10	UNITED STATES NASA-OSS 03/03/72 JUPITER FLYBY			72-012A	03/03/72	NORMAL	STND	70
ANDERSON	CELESTIAL MECHANICS			72-012A-09	03/03/72	NORMAL	STND	70
FILLIUS	JOVIAN TRAPPED RADIATION			72-012A-05	12/19/73	NORMAL	STND	70
GEHRELS	IMAGING PHOTOPOLARIMETER (IPP)			72-012A-07	03/03/72	NORMAL	STND	71
JUDGE	ULTRAVIOLET PHOTOMETRY			72-012A-06	03/03/72	NORMAL	STND	71
KINARD	METEOROID DETECTORS			72-012A-04	03/03/72	NORMAL	STND	71
KLIORE	S-BAND OCCULTATION			72-012A-10	12/05/73	NORMAL	ZERO	71
MCDONALD	COSMIC-RAY SPECTRA			72-012A-12	03/03/72	NORMAL	STND	71
SIMPSON	CHARGED PARTICLE COMPOSITION			72-012A-02	03/03/72	NORMAL	STND	72
VAN ALLEN	JOVIAN CHARGED PARTICLES			72-012A-11	03/03/72	NORMAL	STND	72
WOLFE	PLASMA			72-012A-13	03/03/72	NORMAL	STND	72
PIONEER 11	UNITED STATES NASA-OSS 04/06/73 SATURN FLYBY			73-019A	04/06/73	NORMAL	STND	72
ANDERSON	CELESTIAL MECHANICS			73-019A-09	04/06/73	NORMAL	STND	73
FILLIUS	JOVIAN TRAPPED RADIATION			73-019A-05	04/06/73	NORMAL	STND	73
GEHRELS	IMAGING PHOTOPOLARIMETER (IPP)			73-019A-07	04/06/73	NORMAL	STND	73
INGERSOLL	INFRARED RADIOMETER			73-019A-08	10/03/79	NORMAL	ZERO	73
JUDGE	ULTRAVIOLET PHOTOMETRY			73-019A-06	04/06/73	NORMAL	STND	73
KINARD	METEOROID DETECTORS			73-019A-04	04/06/73	NORMAL	STND	74
KLIORE	S-BAND OCCULTATION			73-019A-10	09/02/79	NORMAL	ZERO	74
MCDONALD	COSMIC-RAY SPECTRA			73-019A-12	04/06/73	NORMAL	STND	74
SIMPSON	CHARGED PARTICLE COMPOSITION			73-019A-02	04/06/73	NORMAL	STND	74
SMITH	MAGNETIC FIELDS			73-019A-01	04/06/73	NORMAL	STND	74
VAN ALLEN	JOVIAN CHARGED PARTICLES			73-019A-11	04/06/73	NORMAL	STND	74
WOLFE	PLASMA			73-019A-13	12/04/77	NORMAL	STND	75
PIONEER VENUS 1	UNITED STATES NASA-OSS 05/20/78 VENUS ORBITER			78-051A	05/20/78	NORMAL	STND	75
BRACE	LANGMUIR PROBE			78-051A-01	12/05/78	NORMAL	STND	75
CROFT	RADIO SCIENCE TEAM			78-051A-03	05/20/78	NORMAL	STND	75
DONAHUE	PARTICIPATING THEORIST DONAHUE			78-051A-04	NA	NA	NA	75
EVANS	TRANSIENT GAMMA-RAY SOURCES			78-051A-05	05/20/78	NORMAL	STND	75
HANSEN	CLOUD PHOTOPOLARIMETER			78-051A-06	05/20/78	NORMAL	STND	76
KNUDSEN	RETARDING POTENTIAL ANALYZER			78-051A-07	05/20/78	NORMAL	STND	76
MASURSKY	PARTICIPATING THEORIST MASURSKY			78-051A-08	NA	NA	NA	76
MCGILL	PARTICIPATING THEORIST MCGILL			78-051A-09	NA	NA	NA	76
NAGY	PARTICIPATING THEORIST NAGY			78-051A-10	NA	NA	NA	76
NIEMANN	NEUTRAL PARTICLE MASS SPECTROMETER			78-051A-11	12/05/78	NORMAL	STND	76

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	*****CURRENT STATUS***** EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
PEITTEGILL RUSSELL SCARF SCHUBERT STEWART TAYLOR, JR. WOLFE	RADAR ALTIMETER TRIAXIAL FLUXGATE MAGNETOMETER ELECTRIC FIELD DETECTOR PARTICIPATING THEORIST SCHUBERT PROGRAMMABLE ULTRAVIOLET SPECTROMETER ION MASS SPECTROMETER SOLAR WIND PLASMA DETECTOR			78-051A-02 78-051A-12 78-051A-13 78-051A-14 78-051A-15 78-051A-17 78-051A-18	02/12/79 05/20/78 05/20/78 NA 12/05/78 12/05/78 05/20/78	NORMAL NORMAL NORMAL NA NORMAL NORMAL NORMAL	STND STND STND NA STND STND STND	77 77 77 77 77 77 77
PIONEER VENUS 1978 ORBIT	SEE PIONEER VENUS 1							
PIONEER VENUS ORBITER	SEE PIONEER VENUS 1							
PIONEER-A	SEE PIONEER 6							
PIONEER-B	SEE PIONEER 9							
PIONEER-F	SEE PIONEER 10							
PIONEER-G	SEE PIONEER 11							
PROGNOZ 6 LICKIN	U.S.S.R. SAS SOLAR X-RAY SPECTROMETER	12/25/80	GEOCENTRIC	80-103A 80-103A-01	12/25/80 12/26/80	NORMAL NORMAL	STND STND	78 78
S 6E	SEE AE-E							
SAGE MCCORMICK	UNITED STATES STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)	NASA-OSTA 02/18/79	GEOCENTRIC	79-013A 79-013A-01	12/11/79 06/12/79	NORMAL PARTIAL	SUBS SUBS	78 78
SAN MARCO-B/L BROGLIO HANSON MAYNARD SCHMIDTKE SPENCER	ITALY UNITED STATES CRA NASA-OSS DRAG BALANCE AND AIR DENSITY ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER) IVI 3-AXIS ELECTRIC FIELD INSTRUMENT (EFI) AIRGLOW-SOLAR SPECTROMETER WIND AND TEMPERATURE SPECTROMETER (WATS)	03/00/82	GEOCENTRIC	SM-DL SM-DL -01 SM-DL -03 SM-DL -05 SM-DL -02 SM-DL -04		APPROVED MISSION		136 136 137 137 137 137
SAN MARCO-B/M BROGLIO	UNITED STATES ITALY NASA-OSS CRA IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT	07/00/83	GEOCENTRIC	SM-DM SM-DM -01		APPROVED MISSION		137 138
SAS-D	SEE IUE							
SATS	SEE MCM							
SCATHA	SEE STP P78-2							
SEO	SEE BHASKARA							
SESP P78-2A	SEE STP P78-2							
SHUTTLE OFT-2	SEE OSTA-1							
SHUTTLE OFT-4	SEE OSS-1							
SIRIO-2	INTERNATIONAL ITALY ESA-ESTEC CRA	02/20/82	GEOCENTRIC	SIRIO-2		APPROVED MISSION		138
SIRIO-II	SEE SIRIO-2							
SME BARTH BARTH BARTH BARTH BARTH BARTH	UNITED STATES UV OZONE INFRARED RADIOMETER (4 CHANNELS) 1.27 MICROMETER AIRGLOW VISIBLE NITROGEN DIOXIDE SOLAR UV MONITOR SOLAR PROTON ALARM	NASA-OSS 09/15/81	GEOCENTRIC	SME SME -01 SME -02 SME -03 SME -04 SME -05 SME -06		APPROVED MISSION		138 138 139 139 139 139 139
SMH ACTON CHUPP DE JAGER FROST MOUSE TANDBERG-HANSEN WILLSON	UNITED STATES SOFT X-RAY POLYCHROMATOR (SRP) GAMMA-RAY SPECTROMETER (GRE) HARD X-RAY IMAGING SPECTROMETER (HRIIS) HARD X-RAY BURST SPECTROMETER (HXRBS) CORONAGRAPH/POLARIMETER ULTRAVIOLET SPECTROMETER AND POLARIMETER ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR	NASA-OSS 02/14/80	GEOCENTRIC	80-014A 80-014A-04 80-014A-07 80-014A-05 80-014A-06 80-014A-01 80-014A-02 80-014A-08	06/01/80 11/23/80 02/17/80 11/23/80 02/19/80 09/01/80 11/23/80 12/11/80	PARTIAL NORMAL NORMAL NORMAL NORMAL INOPERABLE NORMAL PARTIAL	SUBS ZERO STND ZERO STND ZERO ZERO SUBS	78 79 79 79 79 80 80 80
SMS 1 NESS STAFF NESS STAFF	UNITED STATES UNITED STATES NASA-NESS NASA-OSTA VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) METEOROLOGICAL DATA COLLECTION AND	05/17/74	GEOCENTRIC	74-033A 74-033A-01 74-033A-05	01/29/81 01/29/81 01/29/81	INOPERABLE INOPERABLE INOPERABLE	ZERO ZERO ZERO	80 81 81

SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	SSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
PRINC. INVEST. NAME	EXPERIMENT NAME							
WILLIAMS	TRANSMISSION SYSTEM							
WILLIAMS	ENERGETIC PARTICLE MONITOR			74-033A-02	01/29/81	INOPERABLE	ZERO	01
WILLIAMS	SOLAR X-RAY MONITOR			74-033A-03	01/29/81	INOPERABLE	ZERO	01
WILLIAMS	MAGNETIC FIELD MONITOR			74-033A-04	01/29/81	INOPERABLE	ZERO	01
SMS 2	UNITED STATES	NOAA-NESS	02/06/75 GEOCENTRIC	75-011A	04/19/79	NORMAL	STND	01
NESS STAFF	UNITED STATES	NASA-OSTA		75-011A-04	04/19/79	NORMAL	STND	02
NESS STAFF	VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-011A-05	04/19/79	PARTIAL	SUBS	02
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-011A-01	07/03/78	NORMAL	ZERO	02
WILLIAMS	ENERGETIC PARTICLE MONITOR			75-011A-02	07/03/78	NORMAL	ZERO	02
WILLIAMS	SOLAR X-RAY MONITOR			75-011A-03	07/03/78	PARTIAL	ZERO	02
SMS-A	SEE SMS 1							
SMS-B	SEE SMS 2							
SMS-C	SEE GOES 1							
SOLAR MAXIMUM MISSION	SEE SMM							
SOLAR MESOSPHERE EXPL	SEE SME							
SOLAR POLAR	SEE ISPM/ESA							
SOLAR POLAR	SEE ISPM/NASA							
SOLWIND	SEE STP P78-1							
SOLWIND	SEE STP P78-1							
SPACE ASTROMETRY	SEE HIPPARCOS							
SPACE SHUTTLE LDEF-A	UNITED STATES	NASA-OAST	10/02/84 GEOCENTRIC	SSLDEF		APPROVED MISSION		139
AHLBORN	ORBITAL LUBRICATION EXPERIMENT			SSLDEF -25				140
BANKS	ION BEAM TEXTURED AND COATED SURFACES			SSLDEF -26				140
BLUE	EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS			SSLDEF -43				140
BOURRIEAU	OPTICAL FIBERS AND COMPONENTS			SSLDEF -02				140
BRANDHORST, JR.	ADVANCED PHOTOVOLTAIC EXPERIMENT			SSLDEF -50				140
BUCKER	FREE FLYER BIOSTACK			SSLDEF -39				140
CALHOUN	CASCADE VARIABLE CONDUCTANCE HEAT PIPE			SSLDEF -08				140
CALLEN	SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS			SSLDEF -40				141
CRIFO	THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE			SSLDEF -20				141
DELASI	EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS			SSLDEF -06				141
FELBECK	SPACE EXPOSURE INFLUENCE ON MECHANICAL PROPERTIES OF HI-TOUGHNESS GRAPHITE EPOXY			SSLDEF -14				141
FILZ	PASSIVE COSMIC RADIATION DETECTOR			SSLDEF -42				141
FLAMAND	RULED AND HOLOGRAPHIC GRATINGS			SSLDEF -19				141
GREGORY	THE INTERACTION OF ATOMIC HYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE			SSLDEF -27				141
HICKEY	PASSIVE EXPOSURE OF EARTH RADIATION BUDGET EXPERIMENT COMPONENTS			SSLDEF -51				141
HORZ	CHEMISTRY OF MICROMETEORIDS			SSLDEF -36				141
HUMES	SPACE DEBRIS IMPACT STUDY			SSLDEF -03				142
JOHNSTON	FIBER OPTICS EXPERIMENT			SSLDEF -47				142
LAVOI	LARGE SPACE STRUCTURE LIGHTING EVALUATION			SSLDEF -17				142
LIND	GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW GRAVITY			SSLDEF -48				142
LIND	INTERSTELLAR GAS			SSLDEF -41				142
MALMERBE	VACUUM DEPOSITED OPTICAL COATINGS			SSLDEF -32				142
MANDEVILLE	STUDY OF METEORIDS IMPACT CRATERS ON VARIOUS MATERIAL			SSLDEF -33				142
MANDEVILLE	DEUTERON DEBRIS COLLECTION WITH STACKED DETECTORS			SSLDEF -31				142
MCDONNELL	MULTIPLE FOIL MICROABRASION PACKAGE			SSLDEF -12				142
MCINTOSH, JR.	LOW TEMPERATURE HEAT PIPE EXPERIMENT			SSLDEF -44				143
NICHOLS	EFFECTS OF SOLAR RADIATION ON GLASSES			SSLDEF -49				143
O'SULLIVAN	HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS			SSLDEF -34				143
PAILLOUS	THERMAL COATINGS AND STRUCTURAL MATERIAL			SSLDEF -35				143
POWELL	GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE			SSLDEF -46				143
PREUSS	CRITICAL SURFACE DEGRADATION EFFECTS ON COATINGS AND SOLAR CELLS			SSLDEF -38				143
RAND	BALLOON MATERIALS DEGRADATION			SSLDEF -10				143
ROBERTSON	EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS			SSLDEF -37				143
ROBINSON, JR.	TRANSVERSE FLAT PLATE HEAT PIPE							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	-----CURRENT STATUS-----	
*****PRINC. INVEST. NAME*****	EXPERIMENT NAME			EP0CH MMDDYY	STATUS DATA RATE PAGE NO.
	PERFORMANCE				
SCHALL	SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS			SSLDEF -15	143
SCOTT, JR.	ATOMIC OXYGEN STIMULATED OUTGASSING			SSLDEF -07	144
SEELEY	HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS			SSLDEF -23	144
SELLEN, JR.	SPACE PLASMA-HIGH VOLTAGE DRAINAGE			SSLDEF -09	144
SHAPIRO	HEAVY IONS IN SPACE			SSLDEF -13	144
SINGER	INTERPLANETARY DUST			SSLDEF -52	144
SLEMP	THERMAL CONTROL SURFACES(PASSIVE)			SSLDEF -05	144
SLEMP	SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT			SSLDEF -21	144
TAYLOR	SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS			SSLDEF -16	144
TENNYSON	PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT			SSLDEF -24	145
VENABLES	RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT			SSLDEF -22	145
WHITAKER	SOLAR ARRAY MATERIALS (PASSIVE)			SSLDEF -45	145
WILKES	THERMAL CONTROL SURFACES			SSLDEF -04	145
SPACE TELESCOPE	SEE ST				
SPACE TEST PROGRAM P78-1	SEE STP P78-1				
SPACE TEST PROGRAM P80-1	SEE STP P80-1				
SPACELAB 1	INTERNATIONAL UNITED STATES	ESA NASA-DS1	06/05/83 GEOCENTRIC	SPALAB1	APPROVED MISSION 145
ACKERMAN	GRILLE SPECTROMETER			SPALAB1-18	145
ANDRESEN	ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER			SPALAB1-28	145
BEAUJEAN	ISOTOPE STACK			SPALAB1-27	146
BEGHIN	PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS			SPALAB1-75	146
BENTON	HZE-PARTICLE DOSIMETER			SPALAB1-11	146
BERTAUX	INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA			SPALAB1-22	146
BOWYER	FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT			SPALAB1-07	146
BROWN	MUTATION OF HELIANTHUS ANNUUS			SPALAB1-12	146
BUCKER	ADVANCED BIOTACK EXPERIMENT			SPALAB1-32	147
COGOLI	LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS			SPALAB1-36	147
COURTES	VERY WIDE FIELD GALACTIC CAMERA			SPALAB1-27	147
CROMMELYNCK	ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT			SPALAB1-26	147
ESA STAFF	METRIC CAMERA FACILITY			SPALAB1-38	147
ESA STAFF	MICROWAVE FACILITY			SPALAB1-39	147
ESA STAFF	SPACE SLED FACILITY			SPALAB1-40	147
ESA STAFF	SPACE PROCESSING LABORATORY			SPALAB1-42	148
GAUER	MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN			SPALAB1-31	148
GAUER	COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES			SPALAB1-37	148
GAUSE	TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL			SPALAB1-10	148
GREEN	ELECTRO-PHYSIOLOGICAL TAPE RECORDER			SPALAB1-35	148
HART	GEOPHYSICAL FLUID FLOW			SPALAB1-08	148
HERSE	WAVES IN THE OH EMISSION LAYER			SPALAB1-19	148
HONECK	MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT			SPALAB1-34	149
KIMZEY	INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN			SPALAB1-14	149
KEMDE	ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING			SPALAB1-03	149
OBAYASHI	SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)			SPALAB1-02	149
PAN	BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G			SPALAB1-09	149
RESCHKE	VESTIBULO-SPINAL REFLEX MECHANISMS			SPALAB1-16	149
ROSS	MASS DISCRIMINATION DURING WEIGHTLESSNESS			SPALAB1-30	150
SCAND	BALLISTOCARDIOGRAPHIC RESEARCH IN WEIGHTLESSNESS			SPALAB1-33	150
SULZMAN	CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS			SPALAB1-15	150
THEILE	DC AND LOW FREQUENCY VECTOR MAGNETOMETER			SPALAB1-23	150
THUILLIER	TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE			SPALAB1-20	150
THUILLIER	MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS			SPALAB1-21	150
TORR	AN IMAGING SPECTROMETRIC OBSERVATORY			SPALAB1-01	150
VON BAUMGARTEN	HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS)			SPALAB1-41	151
VOSS, JR.	EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS			SPALAB1-17	151

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* * SPACECRAFT NAME *****PRINC. INVEST. NAME *	COUNTRY AND AGENCY *****EXPERIMENT NAME *****	LAUNCH DATE	ORBIT TYPE	* * * NSSDC ID *	-----CURRENT STATUS----- EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
WILHELM	STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION			SPALAB1-24				151
WILLSON	ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR			SPALAB1-04				151
YOUNG	VESTIBULAR STUDIES			SPALAB1-13				151
SPACELAB 2	UNITED STATES NASA-OSS 10/31/83 GEOCENTRIC			SPALAB2		APPROVED MISSION		151
BRUECKNER	SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS)			SPALAB2-10				152
BRUECKNER	SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM)			SPALAB2-11				152
COWLES	INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION			SPALAB2-02				152
FAZIO	SMALL, HELIUM-COOLED INFRARED TELESCOPE			SPALAB2-05				152
GABRIEL	SOLAR CORONAL HELIUM ABUNDANCE			SPALAB2-09				153
NASON	DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G			SPALAB2-13				153
MENDILLO	PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY			SPALAB2-04				153
MEYER	ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI			SPALAB2-06				153
SCHNOES	VITAMIN D METABOLITES AND BONE DEMINERALIZATION			SPALAB2-01				154
SHAWHAN	EJECTABLE PLASMA DIAGNOSTICS PACKAGE			SPALAB2-03				154
TITLE	SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM			SPALAB2-08				154
WILLMORE	HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES			SPALAB2-07				155
SPACELAB 3	UNITED STATES NASA-OSS 04/10/84 GEOCENTRIC			SPALAB3		APPROVED MISSION		155
BELOUET	MERCURY IODIDE CRYSTAL			SPALAB3-22				155
BISWAS	IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES			SPALAB3-15				155
FARMER	ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS)			SPALAB3-14				155
HANT	GEOPHYSICAL FLUID FLOW CELL (GFFC)			SPALAB3-10				156
LAL	FLUID EXPERIMENT SYSTEMS (FES)			SPALAB3-01				156
NONE ASSIGNED	RESEARCH ANIMAL HOLDING FACILITY (RAMF)			SPALAB3-11				156
SCHNEPPLE	VAPOR CRYSTAL GROWTH SYSTEM (VCGS)			SPALAB3-02				156
WANG	DROP DYNAMICS MODULE (DDM) EXPERIMENTS			SPALAB3-09				156
SPOT	FRANCE CNES 04/00/84 GEOCENTRIC			SPOT		APPROVED MISSION		156
CRIS-STAFF	HIGH RESOLUTION VISIBLE IMAGER			SPOT -01				157
ST	UNITED STATES NASA-OSS 12/15/83 GEOCENTRIC			LST		APPROVED MISSION		157
BLESS	HIGH-SPEED PHOTOMETER (HSP)			LST -06				157
BRANDT	HIGH-RESOLUTION SPECTROGRAPH (HRS)			LST -02				157
HARMS	FAINT-OBJECT SPECTROGRAPH (FOS)			LST -03				158
JEFFERYS	ASTROMETRY SCIENCE			LST -09				158
VAN DE HULST	FAINT-OBJECT CAMERA (FOC)			LST -08				158
WESTPHAL	WIDE-FIELD CAMERA (WFC)			LST -07				158
STP P78-1	UNITED STATES DOD-USAF 02/24/79 GEOCENTRIC			79-017A	02/24/79	NORMAL	STND	82
BOWYER	EXTREME ULTRAVIOLET SPECTROMETER			79-017A-04	03/13/80	NORMAL	ZERO	83
IMHOF	GAMMA RAY SPECTROMETER			79-017A-01	02/24/79	NORMAL	STND	83
LANDECKER	SOLAR X-RAY SPECTROMETER			79-017A-03	11/19/80	PARTIAL	SUBS	83
NICHEL	SOLAR WIND MONITOR			79-017A-02	02/24/79	PARTIAL	STND	83
PEPIN	PRELIMINARY AEROSOL MONITOR			79-017A-07	02/24/79	NORMAL	STND	83
SHULMAN	X-RAY MONITOR			79-017A-06	02/24/79	NORMAL	STND	83
VANCOUR	HIGH LATITUDE PARTICLE SPECTROMETER			79-017A-05	02/24/79	NORMAL	STND	83
STP P78-2	UNITED STATES DOD-USAF 01/30/79 GEOCENTRIC			79-007A	01/30/79	NORMAL	STND	84
AGGSON	ELECTRIC FIELD DETECTOR			79-007A-05	02/25/79	NORMAL	STND	84
BLAKE	ENERGETIC PROTON DETECTOR			79-007A-14	01/31/79	NORMAL	STND	84
COHEN	ELECTRON GUN-ION GUN			79-007A-07	10/25/79	PARTIAL	STND	84
FENNEL	SPACECRAFT SHEATH FILDS DETECTOR			79-007A-06	03/30/79	PARTIAL	SUBS	84
HALL	QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS			79-007A-03	01/30/79	NORMAL	STND	84
HALL	THERMAL CONTROL SAMPLE MONITOR			79-007A-04	01/30/79	NORMAL	STND	85
HARDY	RAPID SCAN PARTICLE DETECTOR			79-007A-12	02/09/79	NORMAL	STND	85
JOHNSON	ENERGETIC ION SPECTROMETER			79-007A-13	02/08/79	NORMAL	STND	85
KOONS	CHARGING ELECTRICAL EFFECTS ANALYZER			79-007A-02	02/05/79	NORMAL	STND	85
LEDLEY	MAGNETIC FIELD MONITOR			79-007A-08	02/22/79	NORMAL	STND	85
MIZERA	SPACECRAFT SURFACE POTENTIAL MONITOR			79-007A-01	10/01/79	PARTIAL	STND	85
NANEVICZ	TRANSIENT PULSE MONITOR			79-007A-16	02/00/79	NORMAL	STND	85
HEAGAN	HIGH-ENERGY PARTICLE DETECTOR			79-007A-15	01/31/79	NORMAL	STND	85
WHIPPLE	UCSD CHARGED PARTICLE DETECTOR			79-007A-11	01/31/79	NORMAL	STND	85
STP P80-1	UNITED STATES DOD-USAF 06/00/83 GEOCENTRIC			PRO-1		APPROVED MISSION		159
BOWYER	EXTREME ULTRAVIOLET PHOTOMETER			PRO-1 -03				59
LARSON	TEAL RUBY			P80-1 -01				17
POWER	ION AUXILIARY PROPULSION SYSTEM			PRO-1 -02				15
STP PROBE	SEE ISEE 3							
STRAT AERO AND GAL EXP	SEE SAGE							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* * ***** * *	SPACECRAFT NAME ***** *PRINC. INVEST. NAME *	COUNTRY AND AGENCY ***** EXPERIMENT NAME *****	LAUNCH DATE	ORBIT TYPE	* * ***** * *	NSSDC ID	-----CURRENT STATUS----- EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
	SYNCH METEOROL SATELL A	SEE SMS 1								
	SYNCH METEOROL SATELL B	SEE SMS 2								
TIP 1	POTERRA	UNITED STATES TRIAXIAL FLUXGATE MAGNETOMETER	DOD-NAVY 09/02/72	GEOCENTRIC		72-069A 72-069A-01	12/06/74 09/02/72	NORMAL NORMAL	STND STND	86 86
TIROS-N	NESS STAFF	UNITED STATES NOAA-NESS ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)	10/13/78	GEOCENTRIC		78-096A 78-096A-01	02/21/81 02/21/81	INOPERABLE INOPERABLE	ZERO ZERO	86 86
	NESS STAFF	OPERATIONAL VERTICAL SOUNDER				78-096A-02	02/21/81	INOPERABLE	ZERO	86
	NESS STAFF	DATA COLLECTION SYSTEM (DCS)				78-096A-03	02/21/81	INOPERABLE	ZERO	87
	WILLIAMS	SPACE ENVIRONMENT MONITOR				78-096A-04	02/21/81	INOPERABLE	ZERO	87
TRIAD		SEE TIP 1								
TRIAD 1		SEE TIP 1								
TRIAD A		SEE TIP 1								
TRIAD 01 1X		SEE TIP 1								
UARS-1	BRUECKNER	UNITED STATES SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM	NASA-OAST 10/00/88	GEOCENTRIC		UARS-1 UARS-1 -08		APPROVED MISSION		159 159
	CARLSON	GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT				UARS-1 -14				160
	CHANG	THEORETICAL ANALYSIS-CHEMICAL,RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE				UARS-1 -24				160
	CUNNOLD	PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE				UARS-1 -18				160
	GELLER	OBSERV.ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS				UARS-1 -20				160
	GILLE	ADVANCED LIMB SCANNER				UARS-1 -10				160
	GILLE	CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER				UARS-1 -12				160
	GRAYSTONE	THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE				UARS-1 -25				161
	GROSE	STRATOSPHERIC TRANSPORT PROCESSES,BUDGET OF MINOR CONSTITUENTS,AND ENERGETICS				UARS-1 -22				161
	HAYS	HIGH RESOLUTION DOPPLER IMAGER (HRDI)				UARS-1 -02				161
	HEELIS	ION CONVECTION ELECTRODYNAMICS				UARS-1 -06				161
	HOLTEN	WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE				UARS-1 -17				161
	HOUGHTON	AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)				UARS-1 -11				161
	LONDON	RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY				UARS-1 -19				162
	MILLER	SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION				UARS-1 -16				162
	MOUNT	ULTRAVIOLET OZONE SPECTROMETER				UARS-1 -03				162
	REPER	ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS				UARS-1 -21				162
	ROCHE	ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP.IN 10-60KM RANGE				UARS-1 -05				162
	ROTHMAN	ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT				UARS-1 -04				163
	RUSSELL, 3RD	OCCULTATION EXPERIMENT (HALOE)				UARS-1 -09				163
	THUILLIER	TEMP AND WIND MEASUREMENT IN THE THERMOSPHERE				UARS-1 -01				163
	FORR	TEMP AND LOWER THERMOSPHERE ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER				UARS-1 -15				163
	WATERS	MICROWAVE LIMB SOUNDER (MLS)				UARS-1 -13				163
	WINNINGHAM	PARTICLE ENVIRONMENT MONITOR (PEM)				UARS-1 -07				163
	ZUREK	RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE				UARS-1 -23				164
UARS-2	BRUECKNER	UNITED STATES SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM	NASA-OA 10/00/89	GEOCENTRIC		UARS-2 UARS-2 -08		APPROVED MISSION		164 164
	CARLSON	GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT				UARS-2 -14				164
	CHANG	THEORETICAL ANALYSIS-CHEMICAL,RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE				UARS-2 -24				164
	CUNNOLD	PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE				UARS-2 -18				165
	GELLER	OBSERV.ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS				UARS-2 -20				165
	GILLE	ADVANCED LIMB SCANNER				UARS-2 -10				165
	GILLE	CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER				UARS-2 -12				165
	GRAYSTONE	THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE				UARS-2 -24				165
	GROSE	STRATOSPHERIC TRANSPORT PROCESSES,BUDGET				UARS-2 -22				165

**INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR**

* SPACECRAFT NAME		COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	-----CURRENT STATUS-----	EPOCH	STATUS	DATA RATE	PAGE NO.
*PRINC. INVEST. NAME		EXPERIMENT NAME				MMDDYY				
		OF MINOR CONSTITUENTS AND ENERGY								166
MAYS		HIGH RESOLUTION DOPPLER IMAGER (HRDI)			UARS-2 -02					166
MEELIS		ION CONVECTION ELECTRODYNAMICS			UARS-2 -06					166
MOLTON		WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE			UARS-2 -17					166
HOUGHTON		AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)			UARS-2 -11					166
LONDON		RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY			UARS-2 -1V					166
MILLER		SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETATION OF UARS METEOROLOGICAL INFORMATION			UARS-2 -16					167
MOUNT		ULTRAVIOLET OZONE SPECTROMETER			UARS-2 -03					167
POTEMRA		MAGNETOMETER EXPERIMENT			UARS-2 -26					167
REBER		ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS			UARS-2 -21					167
ROCHE		ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE			UARS-2 -05					167
ROTTMAN		ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT			UARS-2 -04					167
RUSSELL, JR		HALOGEN OCCULTATION EXPERIMENT (HALOE)			UARS-2 -09					168
THULLIER		TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE			UARS-2 -01					168
TORR		ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER			UARS-2 -15					168
WATERS		MICROWAVE LIMB SOUNDER (MLS)			UARS-2 -13					168
WINNIGHAM		PARTICLE ENVIRONMENT MONITOR (PEM)			UARS-2 -07					168
ZUREK		RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE			UARS-2 -23					169
UK 6		UNITED KINGDOM SRC	06/02/79	GEOCENTRIC	79-047A	06/02/79	PARTIAL	STND		87
		UNITED STATES NASA-OSS			79-047A-03	06/02/79	PARTIAL	SUBS		87
BOYD		X-RAY GRAZING INCIDENCE SYSTEM			79-047A-01	06/02/79	PARTIAL	SUBS		87
FOWLER		COSMIC RAY			79-047A-02	06/02/79	PARTIAL	SUBS		87
POUNDS		X-RAY PROPORTIONAL COUNTERS								
UME 2		SEE ISS-B								
UNITED KINGDOM-6		SEE UK 6								
UOSAT		UNITED STATES AMSAT	09/15/81	GEOCENTRIC	UOSAT		APPROVED MISSION			169
		UNITED KINGDOM U OF SURR			UOSAT -01					169
ACUNA		TRIAXIAL FLUXGATE MAGNETOMETER			UOSAT -03					169
FEREDDE		CHARGED PARTICLE			UOSAT -04					169
SMITHERS		HIGH FREQUENCY BEACON			UOSAT -02					169
SWEETING		EARTH IMAGING			UOSAT -05					169
SWEETING		MICROWAVE BEACON								
UPPER ATMOSPHER. RESEAR. SAT		SEE UARS-1								
UPPER ATMOSPHER. RESEAR. SAT		SEE UARS-2								
USAF OPERATIONAL SAT-76		SEE 1976-059A								
USAF OPERATIONAL SAT-77		SEE 1977-007A								
USAF OPERATIONAL SAT-79		SEE 1979-053A								
VENERA 11		U.S.S.R. SAS	09/09/78	HELIOCENTRIC	78-084A	09/09/78	NORMAL	STND		87
ESTULIN		GAMMA-RAY SPECTROMETER			78-084A-01	09/09/78	NORMAL	STND		88
GRINGAUZ		RETARDING POTENTIAL TRAPS			78-084A-02	09/09/78	NORMAL	STND		88
KURY		UV GRATING MONOCHROMATOR			78-084A-03	09/09/78	NORMAL	STND		88
LOGACHEV		ELECTRON AND PROTON SPECTROMETER			78-084A-04	09/09/78	NORMAL	STND		88
MAZETS		GAMMA-RAY BURST DETECTORS			78-084A-05	09/09/78	NORMAL	STND		88
PISARENKO		PROTON SPECTROMETER			78-084A-06	09/09/78	NORMAL	STND		88
SAVICH		TWO-FREQUENCY TRANSMITTERS			78-084A-07	09/09/78	NORMAL	STND		88
VAISBERG		SOLAR WIND PLASMA DETECTORS			78-084A-08	09/09/78	NORMAL	STND		88
VENERA 12		U.S.S.R. SAS	09/14/78	HELIOCENTRIC	78-086A	09/14/78	NORMAL	STND		89
ESTULIN		GAMMA-RAY SPECTROMETER			78-086A-01	09/09/78	NORMAL	STND		89
GRINGAUZ		RETARDING POTENTIAL TRAPS			78-086A-02	09/09/78	NORMAL	STND		89
KURY		UV GRATING MONOCHROMATOR			78-086A-03	09/09/78	NORMAL	STND		89
LOGACHEV		ELECTRON AND PROTON SPECTROMETER			78-086A-04	09/09/78	NORMAL	STND		89
MAZETS		GAMMA-RAY BURST DETECTORS			78-086A-05	09/09/78	NORMAL	STND		89
PISARENKO		PROTON SPECTROMETER			78-086A-06	09/09/78	NORMAL	STND		89
SAVICH		PROTON SPECTROMETER			78-086A-07	09/09/78	NORMAL	STND		89
VAISBERG		SOLAR WIND PLASMA DETECTORS			78-086A-08	09/09/78	NORMAL	STND		89
VIKING 1 LANDER		UNITED STATES NASA-OSS	08/20/75	MARS LANDER	75-075C	07/20/76	NORMAL	STND		90
MESS		METEOROLGY			75-075C-07	09/08/76	PARTIAL	SUBS		90
MICHAEL, JR.		LANDER RADIO SCIENCE			75-075C-11	02/26/79	NORMAL	SUBS		90
MUTCH		LANDER IMAGING			75-075C-06	02/26/79	NORMAL	SUBS		90
VIKING 1 ORBITER		UNITED STATES NASA-OSS	08/20/75	AREOCENTRIC	75-075A	09/30/80	INOPERABLE	ZERO		90
CARR		ORBITER IMAGING			75-075A-01	08/07/80	INOPERABLE	ZERO		91
FARMER		MARS ATMOSPHERIC WATER DETECTION (MAWD)			75-075A-03	08/07/80	INOPERABLE	ZERO		91
KIEFFER		INFRARED THERMAL MAPPING (IRTH)			75-075A-02	08/07/80	INOPERABLE	ZERO		91

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	KSSDC ID	EPCH MDDVV	STATUS	DATA RATE	PAGE NO.
MICHAEL, JR.	ORBITER RADIO SCIENCE			75-875A-84	88/07/88	INOPERABLE	2400	91
VIKING-B LANDER	SEE VIKING 1 LANDER							
VIKING-B ORBITER	SEE VIKING 1 ORBITER							
VIKING-B	SEE VIKING 1 ORBITER							
VOIR	UNITED STATES NASA-OSS 08/25/86 VENUS ORBITER			VOIR		APPROVED MISSION		170
BARTH	AIRGLOW PHOTOMETER			VOIR -84				170
BRACE	ELECTRON TEMPERATURE AND DENSITY			VOIR -87				170
HEELIS	VENUS IONOSPHERE DYNAMICS			VOIR -86				170
JANSSEN	SCANNING MICROWAVE RADIOMETER			VOIR -85				170
LEFEBVRE	GRAVITY, ATMOSPHERIC, AND SOLID TIDES (GASTE)			VOIR -82				170
PETTINGILL	SYNTHETIC APERTURE RADAR (SAR)			VOIR -81				170
SJOGREN	RADIONETRY ALTIMETRY GRAVITY (RAGE)			VOIR -83				171
SPENCER	VENUS THERMOSPHERE DYNAMICS			VOIR -86				171
VOYAGER 1	UNITED STATES NASA-OSS 09/05/77 SATURN FLYBY			77-884A	09/06/77	NORMAL	STND	92
BRIDGE	PLASMA SPECTROMETERS			77-884A-86	11/23/88	NORMAL	2400	92
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			77-884A-84	09/06/77	NORMAL	STND	92
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			77-884A-83	09/06/77	NORMAL	STND	92
KRINIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE			77-884A-87	09/06/77	NORMAL	STND	92
NESS	TRIAXIAL FLUXGATE MAGNETOMETERS			77-884A-85	07/06/77	NORMAL	STND	93
SCARF	PLASMA WAVE (.01-56 KHz)			77-884A-13	07/06/77	NORMAL	STND	93
SMITH	IMAGING			77-884A-81	07/06/77	NORMAL	STND	93
TYLER	RADIO SCIENCE TEAM			77-884A-82	09/06/77	NORMAL	STND	93
VOYT	HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE			77-884A-88	09/06/77	NORMAL	STND	93
WARWICK	PLANETARY RADIO ASTRONOMY			77-884A-18	09/06/77	NORMAL	STND	94
VOYAGER 2	UNITED STATES NASA-OSS 08/20/77 SATURN FLYBY			77-876A	09/06/77	NORMAL	STND	94
BRIDGE	PLASMA SPECTROMETERS			77-876A-86	09/06/77	NORMAL	STND	94
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			77-876A-84	09/06/77	NORMAL	STND	94
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			77-876A-83	09/06/77	NORMAL	STND	94
KRINIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE			77-876A-87	09/06/77	NORMAL	STND	95
LANE	MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A			77-876A-11	07/09/79	PARTIAL	SUBS	95
NESS	TRIAXIAL FLUXGATE MAGNETOMETERS			77-876A-85	09/06/77	NORMAL	STND	95
SCARF	PLASMA WAVE (.01-56 KHz)			77-876A-13	09/06/77	NORMAL	STND	95
SMITH	IMAGING			77-876A-81	09/06/77	NORMAL	STND	95
TYLER	RADIO SCIENCE TEAM			77-876A-82	09/06/77	NORMAL	STND	96
VOYT	HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE			77-876A-88	09/06/77	NORMAL	STND	96
WARWICK	PLANETARY RADIO ASTRONOMY			77-876A-18	09/06/77	NORMAL	STND	96
X-RAY OBSERVATION SAT.	SEE ASTRO-B							

5

INVESTIGATOR NAME INDEX

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5. INVESTIGATOR NAME INDEX

This index contains an alphabetical listing of the names of the investigators or team members associated with each experiment described in Sections 2 and 3. The current organizational affiliation of the person is also shown. Listed under each person's name are the associated experiments. Each experiment contains the spacecraft and experiment name, NSSDC ID code, and the page number referencing the description of the experiment. An asterisk preceding an experiment name identifies the person as the principal investigator or team leader for that experiment.

PRECEDING PAGE BLANK NOT FILMED

ACKERMAN, M. - BIRA, BRUSSELS, BELGIUM *SPACELAB 1, GRILLE SPECTROMETER (SPALAB1-18).....	145
ACKERSON, K.L. - U OF IOWA, IOWA CITY, IA DYNAMICS EXPLORER 1, GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (81-070A-03).....	19
ACTON, L.W. - LOCKHEED PALO ALTO, PALO ALTO, CA *SSM, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	79
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
ACUNA, M.H. - NASA-GSFC, GREENBELT, MD ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	48
*ISPM/NASA, MAGNETIC FIELD (MAG) (ISPMASA-06).....	125
MAGSAT, VECTOR MAGNETOMETER (79-094A-02).....	58
*UOSAT, TRIAXIAL FLUXGATE MAGNETOMETER (UOSAT -01).....	169
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	93
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	95
AFGWC STAFF GLOBAL WEATHER CTR, OFFUTT AFB, NE *DMSP 50-1/F3, OPERATIONAL LINESCAN SYSTEM (OLS) (78-042A-01).....	16
*DMSP 50-1/F4, OPERATIONAL LINESCAN SYSTEM (OLS) (79-050A-01).....	17
*DMSP 50-1/F4, SSM/T-MICROWAVE TEMPERATURE SOUNDER (79-050A-06).....	17
*DMSP 50-1/F5, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSP-F5-01).....	103
*DMSP 50-1/F5, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSM) (DMSP-F5-02).....	103
*DMSP 50-2/F10, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSPF10-01).....	104
*DMSP 50-2/F10, SSM/T-MICROWAVE TEMPERATURE SOUNDER (DMSPF10-02).....	104
*DMSP 50-2/F10, MICROWAVE IMAGER (DMSPF10-05).....	105
*DMSP 50-2/F6, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSP-F6-01).....	105
*DMSP 50-2/F6, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H-2 (SSM-2) (DMSP-F6-02).....	106
*DMSP 50-2/F7, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSP-F7-01).....	107
*DMSP 50-2/F7, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H-2 (SSM-2) (DMSP-F7-02).....	107
*DMSP 50-2/F7, SSM/T-MICROWAVE TEMPERATURE SOUNDER (DMSP-F7-03).....	107
*DMSP 50-2/F8, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSP-F8-01).....	108
*DMSP 50-2/F9, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSP-F9-01).....	109
*DMSP 50-2/F9, SSM/T-MICROWAVE TEMPERATURE SOUNDER (DMSP-F9-02).....	109
*DMSP 50-2/F9, MICROWAVE IMAGER (DMSP-F9-05).....	109
AFGWC STAFF USAF GEOPHYS LAB, BEDFORD, MA *DMSP 50-2/F7, MAGNETOMETER (DMSP-F7-04).....	107
*DMSP 50-2/F7, SPACE RADIATION DOSIMETER (DMSP-F7-07).....	107
AFGWC STAFF USAF TECH APPL CTR, ALEXANDRIA, VA *DMSP 50-2/F6, SCANNING X-RAY SPECTROMETER (DMSP-F6-03).....	106
AGGSON, T.L. - NASA-GSFC, GREENBELT, MD *IMP-J, ELECTROSTATIC FIELDS (73-078A-11).....	48
IMP-J, ELECTROSTATIC WAVES AND RADIO NOISE (73-078A-12).....	41
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	44
*STP P78-2, ELECTRIC FIELD DETECTOR (79-007A-05).....	84
AMEARN, J.S. - MARTIN-MARIETTA LABS, BALTIMORE, MD SPACE SHUTTLE LDEF-A, RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT (SSLDEF -22).....	145
AMLBORN, G. - BALL AEROSPACE SYS DIV, BOULDER, CO *SPACE SHUTTLE LDEF-A, ORBITAL LUBRICATION EXPERIMENT (SSLDEF -25).....	140
AIKYO, K. - RADIO RESEARCH LAB, TOKYO, JAPAN *ISS-0, SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP) (78-018A-01).....	53
ALBRECHT, R. - U OF VIENNA, VIENNA, AUSTRIA ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	158
ALEXANDER, JR., J.K. - NASA-GSFC, GREENBELT, MD VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
ALLISON, L.J. (RETIRED)- NASA-GSFC, GREENBELT, MD NIMBUS 7, TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR) (78-098A-10).....	63
ALVAREZ, J.M. - NASA-LARC, HAMPTON, VA PIONEER 10, METEOROID DETECTORS (72-012A-04).....	71
PIONEER 11, METEOROID DETECTORS (73-019A-04).....	74
ALYEA, F.N. - MASS INST OF TECH, CAMBRIDGE, MA UARS-1, PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE (UARS-1 -18).....	160
UARS-2, PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE (UARS-2 -10).....	165
AMATEAU, M.F. - AEROSPACE CORP, EL SEGUNDO, CA SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS (SSLDEF -15).....	143
ANAND, M. - NASA-JPL, PASADENA, CA VOIR, RADIOMETRY ALTIMETRY GRAVITY (RAGE) (VOIR -03).....	171
ANDERLE, R.J. - USN SURFACE WEAPNS CTR, DAHLGREN, VA *GEOS 3, US NAVY DOPPLER SYSTEM (75-027A-05).....	26
ANDERSON, D. - NOAA-SEL, BOULDER, CO PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	77
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
ANDERSON, D.J. - U OF MICHIGAN, ANN ARBOR, MI SPACELAB 1, VESTIBULO-SPINAL REFLEX MECHANISMS (SPALAB1-16).....	149
ANDERSON, F.P. - NATL RES INST OCEANOL, STELLENBOSCH, REP OF SOUTH AFRICA NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
ANDERSON, J.D. - NASA-JPL, PASADENA, CA	

PRECEDING PAGE BLANK NOT FILMED

C-3

*GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
*PIONEER 6, CELESTIAL MECHANICS (65-105A-07).....	67
*PIONEER 6, RELATIVITY INVESTIGATION (65-105A-10).....	67
*PIONEER 9, CELESTIAL MECHANICS (68-100A-08).....	68
*PIONEER 10, CELESTIAL MECHANICS (72-012A-09).....	70
*PIONEER 11, CELESTIAL MECHANICS (73-019A-09).....	73
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
ANDERSON, K.A. - U OF CALIF, BERKELEY, BERKELEY, CA	
*ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
*ISEE 2, ELECTRONS AND PROTONS (77-1020-08).....	45
*ISEE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	47
*ISEE 3, X- AND GAMMA-RAY BUJSTS (78-079A-14).....	47
ANDRESEN, R.D. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
*SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-20).....	145
ANGEL, J.R. - U OF ARIZONA, TUCSON, AZ	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	158
ANGER, C.D. - U OF CALGARY, CALGARY, ALBERTA, CANADA	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
*ISIS 2, 3914- AND 5577-A PHOTOMETER (71-024A-11).....	51
APEL, J.R. - NOAA-PMEL, SEATTLE, WA	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
ARAKAWA, T. - U OF TOKYO, TOKYO, JAPAN	
JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-067A-06).....	55
ARMSTRONG, T.P. - U OF KANSAS, LAWRENCE, KS	
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
IMP-J, CHARGED PARTICLE MEASUREMENTS EXPERIMENT (73-078A-08).....	41
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
ARNAL, Y. - CNRS, ORLEANS, FRANCE	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
ARNOLD, J.R. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	
HEAD 3, GAMMA-RAY LINE SPECTROMETER (79-082A-01).....	36
ARVIDSON, R.E. - WASHINGTON U, SAINT LOUIS, MO	
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	90
ASBRIDGE, J.R. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
IMP-J, SOLAR PLASMA ELECTROSTATIC ANALYZER (73-078A-10).....	40
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	47
ASHWORTH, D.G. - U OF KENT, CANTERBURY, KENT, ENGLAND	
SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	142
ATHAY, R.G. - HIGH ALTITUDE OBS, BOULDER, CO	
SMM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	80
ATKINS, H.L. - NASA-MSFC, HUNTSVILLE, AL	
SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	147
ATREYA, S.K. - U OF MICHIGAN, ANN ARBOR, MI	
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	118
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
AUSTIN, R. - SCRIPPS INST OCEANOGR, LA JOLLA, CA	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
AXFORD, W.I. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
CCE, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCE -03).....	101
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
BABCOCK, 3RD, R.A. - NASA-LARC, HAMPTON, VA	
SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (PASSIVE) (SSLDEF -05).....	144
BAILLY, C.A. - OXFORD U, OXFORD, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
BAILEY, P.L. - NATL CTR FOR ATMOS RES, BOULDER, CO	
SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
BAKER, D.J. - UTAH STATE U, LOGAN, UT	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
BAKER, D.W. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
1976-059A, ENERGETIC PARTICLE DETECTOR (76-059A-01).....	11
1977-007A, ENERGETIC PARTICLE DETECTOR (77-007A-01).....	11
1979-053A, ENERGETIC PARTICLE DETECTOR (79-053A-01).....	11
1981-025A, ENERGETIC PARTICLE DETECTOR (81-025A-01).....	12

INVESTIGATORS AND EXPERIMENTS

PAGE

BAKER, K.D. - UTAH STATE U, LOGAN, UT	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	162
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	167
BALLA, J.A. - NASA-GSFC, GREENBELT, MD	
LANDSAT 2, MULTISPECTRAL SCANNER (MSS) (75-004A-02).....	56
LANDSAT 3, MULTISPECTRAL SCANNER (MSS) (78-026A-02).....	56
BALMIND, G. - CNES, TOULOUSE, FRANCE	
VOIR, GRAVITY, ATMOSPHERIC, AND SOLID TIDES (GASTE) (VOIR -02).....	170
VOIR, RADIOMETRY ALTIMETRY GRAVITY (RAGE) (VOIR -03).....	171
BAL, A. - IMPERIAL COLLEGE, LONDON, ENGLAND	
ISEE 3, ENERGETIC PROTONS (78-079A-08).....	48
BALSIGER, W. - U OF BERNE, BERNE, SWITZERLAND	
CCE, PLASMA COMPOSITION (CCE -01).....	102
DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (61-070A-06).....	19
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	24
GIOTTO, ION MASS SPECTROMETER (IMS) (GIOTTO -03).....	120
ISEE 1, ION COMPOSITION (77-102A-12).....	45
BARE, S.J. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
IMP-3, SOLAR PLASMA ELECTROSTATIC ANALYZER (73-078A-10).....	40
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	47
ISPA/ESA, PLASMA SPECTROMETER (ISPESA -05).....	123
BANDEEN, W.R. - NASA-GSFC, GREENBELT, MD	
NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	61
BANKS, B.A. - NASA-LERC, CLEVELAND, OH	
SPACE SHUTTLE LDEF-A, ION BEAM TEXTURED AND COATED SURFACES (SSLDEF -01).....	140
BANKS, G.F. - NASA-GSFC, GREENBELT, MD	
LANDSAT-D, MULTISPECTRAL SCANNER (MSS) (LAND-D -02).....	127
LANDSAT-D1, MULTISPECTRAL SCANNER (MSS) (LAND-E -02).....	128
BANKS, P.M. - STANFORD U, PALO ALTO, CA	
DYNAMICS EXPLORER 1, RETARDING ION MASS SPECTROMETER (81-070A-04).....	18
ROSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-4-04).....	133
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	160
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
BARATH, F.T. - NASA-JPL, PASADENA, CA	
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMW) (78-090A-08).....	62
BARBIERI, C. - U OF PADOVA, PADOVA, ITALY	
ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	158
BARFIELD, J.N. - SOUTHWEST RES INST, SAN ANTONIO, TX	
GOES-F, MAGNETIC FIELD MONITOR (GOES-F -04).....	122
BARKSTROA, B.R. - NASA-LARC, HAMPTON, VA	
ERBS-A, EARTH RADIATION BUDGET EXPERIMENT (ERBE) (ERBS-A -01).....	110
BARNES, A. - NASA-ARC, MOFFETT FIELD, CA	
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-1A).....	77
BARNES, W.L. - NASA-GSFC, GREENBELT, MD	
MCMM, HEAT CAPACITY MAPPING RADIOMETER (78-041A-01).....	34
BARNETT, J.J. - OXFORD U, OXFORD, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
BARRINGTON, R.E. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
ISIS 1, VLF RECEIVER (69-009A-03).....	50
ISIS 2, VLF RECEIVER (71-024A-03).....	52
BARTH, C.A. - U OF COLORADO, BOULDER, CO	
GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	115
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	77
SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	162
UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	167
VOIR, AIRGLOW PHOTOMETER (VOIR -04).....	170
BARTKO, JR., F. - MARTIN-MARIETTA AEROSP, DENVER, CO	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	156
BARTLEY, W.C. - DOE HEADQUARTERS, WASHINGTON, DC	
PIONEER 6, COSMIC-RAY ANISOTROPY (65-105A-05).....	67
PIONEER 9, COSMIC-RAY ANISOTROPY (68-108A-05).....	69
BARTOF, J.D.F. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
OSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SHOFT-4-03).....	133
SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	152
SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11).....	152
UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08).....	159
UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -08).....	164

BASS, J.A. - NASA-GSFC, GREENBELT, MD SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	145
BAUER, S.J. - NASA-GSFC, GREENBELT, MD HELIOS-A, SOLAR WIND PLASMA WAVE (74-097A-04).....	37
HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	37
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
BAUM, M.A. - LOWELL OBSERVATORY, FLAGSTAFF, AZ ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	158
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
BEAUJOUR, R. - U OF KIEL, KIEL, FED REP OF GERMANY SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	141
*SPACELAB 1, ISOTOPE STACK (SPALAB1-29).....	146
BEAVER, E.A. - U OF CALIF, SAN DIEGO, LA JOLLA, CA ST, HIGH-RESOLUTION SPECTROGRAPH (NRS) (LST -02).....	157
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	158
BECKERS, J.M. - SACRAMENTO PEAK OBS, SUNSPOT, NM SMM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (88-014A-02).....	80
BEDFORD, D.K. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	155
BEDO, D.E. - USAF GEOPHYS LAB, BEDFORD, MA AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
BEER, R. - NASA-JPL, PASADENA, CA SPACELAB 1, ACTIVE CAVITY RADIONETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	151
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
BEHIN, C. - CNRS, CTR FOR SPECTROM, ORLEANS, FRANCE *ESA-GEOS 2, WAVE FIELD IMPEDANCE (78-071A-11).....	23
*SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
BEHANNON, K.W. - NASA-GSFC, GREENBELT, MD VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	93
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	95
BELCHER, J.W. - MASS INST OF TECH, CAMBRIDGE, MA VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
BELIAN, R.D. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM 1976-059A, ENERGETIC PARTICLE DETECTOR (76-059A-01).....	11
1977-007A, ENERGETIC PARTICLE DETECTOR (77-007A-01).....	11
1979-053A, ENERGETIC PARTICLE DETECTOR (79-053A-01).....	11
1981-025A, ENERGETIC PARTICLE DETECTOR (81-025A-01).....	12
BELL, T.F. - STANFORD U, PALO ALTO, CA DYNAMICS EXPLORER 1, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (81-070A-08).....	19
ISEE 1, VLF WAVE PROPAGATION (77-102A-13).....	44
BELMONT, A.D. - CONTROL DATA CORP, MINNEAPOLIS, MN NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SHUV/TOMS) (78-098A-09).....	62
BELOUET, C. - LAB D'ELECTR PHYS APPL, LIMEIL-BREVANNE, FRANCE *SPACELAB 3, MERCURY IODIDE CRYSTAL (SPALAB3-22).....	155
BELTON, M.J.S. - KITT PEAK NATL OBS, TUCSON, AZ *GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
BENEDICT, G.F. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, ASTROMETRY SCIENCE (LST -09).....	158
BENNETT, K. - ESA-ESTEC, NOORDWIJK, NETHERLANDS GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
BENTON, E.V. - U OF CALIF, SAN FRANC., SAN FRANCISCO, CA *SPACELAB 1, HZE-PARTICLE DOSIMETRY (SPALAB1-11).....	146
BERG, D.E. (RETIRED) - NASA-GSFC, GREENBELT, MD *PIONEER 9, COSMIC DUST DETECTOR (68-100A-04).....	68
BERNHARDT, P.A. - STANFORD U, PALO ALTO, CA SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
BERSET, J.M. - CNRS-LPSP, VERRIERES-LE-BUISSON, FRANCE SPACE SHUTTLE LDEF-A, THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE (SSLDEF -40).....	141
BERTAUX, J.L. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE *SPACELAB 1, INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA (SPALAB1-22).....	146
*VENERA 11, UV GRATING MONOCHROMATOR (78-084A-03).....	88
*VENERA 12, UV GRATING MONOCHROMATOR (78-086A-03).....	89
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
BERTHELIER, J.J. - CNRS, SAINT-MAUR DES FOSSES, FRANCE SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
BERTOTTI, B. - U OF PAVIA, PAVIA, ITALY ISPM/ESA, RADIO SCIENCE (ISPESA -09).....	124

INVESTIGATORS AND EXPERIMENTS

PAGE

BERTSCH, D.L. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
BINDER, A.B. - U OF KIEL, KIEL, FED REP OF GERMANY VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	90
BINNS, W.R. - MCDONNELL-DOUGLAS CORP, SAINT LOUIS, MO HEAD 3, HEAVY NUCLEI (79-082A-03).....	36
BINSACK, J.H. - MASS INST OF TECH, CAMBRIDGE, MA IMP-J, SOLAR PLASMA FARADAY CUP (73-078A-02).....	40
BISMAS, S. - TATA INST OF FUND RES, BOMBAY, INDIA SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	155
BLACKSHEAR, W.T. - NASA-LARC, HAMPTON, VA UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-1 -22).....	161
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-2 -22).....	165
BLAINE, L.R. - NASA-GSFC, GREENBELT, MD OSTA-1, OCEAN COLOR (OCE) (OSTA-1 -05).....	135
BLAKE, J.B. - AEROSPACE CORP, EL SEGUNDO, CA STP P78-2, ENERGETIC PROTON DETECTOR (79-007A-14).....	84
BLAMONT, J.E. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE GALILEO PROBE, NEPHLOMETER (JOP -05).....	118
SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	150
SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	150
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
BLANCHARD, R.C. - NASA-LARC, HAMPTON, VA GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	118
BLASIUS, K.R. - SCIENCE APPL, INC, PASADENA, CA VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
BLEEKER, J.A.M. - U OF LEIDEN, LEIDEN, NETHERLANDS EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	113
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
BLESS, R.C. - U OF WISCONSIN, MADISON, WI ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	157
BLOCK, B.P. - U OF MICHIGAN, ANN ARBOR, MI DYNAMICS EXPLORER 2, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (81-070B-03).....	21
BLUE, M.D. - GEORGIA INST OF TECH, ATLANTA, GA SPACE SHUTTLE LDEF-A, EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS (SSLDEF -26).....	140
BLUM, P. - U OF BONN, BONN, FED REP OF GERMANY UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	163
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	168
BOELLA, G. - U OF MILAN, MILAN, ITALY EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145
BOESE, R.W. - NASA-ARC, MOFFETT FIELD, CA GALILEO PROBE, NET FLUX RADIOMETER (JOP -04).....	117
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	73
HOGGESS, SRD, A. - NASA-GSFC, GREENBELT, MD ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
BOISCHOT, A. - PARIS OBSERVATORY, MEUDON, FRANCE VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
BOKSENBERG, A. - U COLLEGE LONDON, LONDON, ENGLAND ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	158
BORDERIES, N. - CNES, TOULOUSE, FRANCE VOIR, GRAVITY, ATMOSPHERIC, AND SOLID TIDES (GASTE) (VOIR -02).....	170
BORG, M. - KIRUNA GEOPHYS INST, KIRUNA, SWEDEN ESA-GEOS 2, LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-04).....	24
BORN, G. - NASA-JPL, PASADENA, CA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
BORSON, E.N. - AEROSPACE CORP, EL SEGUNDO, CA SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS (SSLDEF -15).....	143
BOSQUED, J.M. - CESR, TOULOUSE, FRANCE ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	45
BOSTROM, C.O. - APPLIED PHYSICS LAB, LAUREL, MD AE-E, PHOTOELECTRON SPECTROMETER (PES) (75-107A-03).....	13
IMP-J, ENERGETIC ELECTRONS AND PROTONS (73-078A-05).....	42
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	47
NOAA 7, SPACE ENVIRONMENT MONITOR (81-059A-04).....	66
NOAA-D, SPACE ENVIRONMENT MONITOR (NOAA-D -04).....	129
NOAA-E, SPACE ENVIRONMENT MONITOR (NOAA-E -04).....	130
NOAA-F, SPACE ENVIRONMENT MONITOR (NOAA-F -04).....	131

NOAA-G, SPACE ENVIRONMENT MONITOR (NOAA-G -04).....	132
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
BOSWELL, R. - ESA-ESTEC, NOORDWIJK, NETHERLANDS SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-29).....	146
BOURRIEAU, J. - CERT/ONERA, TOULOUSE CEDEX, FRANCE *SPACE SHUTTLE LDEF-A, OPTICAL FIBERS AND COMPONENTS (SSLDEF -43).....	148
BOWYER, C.S. - U OF CALIF, BERKELEY, BERKELEY, CA *EUVE, EXTREME ULTRAVIOLET FULL-SKY SURVEY (EUVE -01).....	111
*SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	146
*STP P78-1, EXTREME ULTRAVIOLET SPECTROMETER (79-017A-04).....	83
*STP P80-1, EXTREME ULTRAVIOLET PHOTOMETER (P80-1 -03).....	159
BOYD, R.L.F. - U COLLEGE LONDON, LONDON, ENGLAND ESA-GEOS 2, THERMAL PLASMA FLOW (78-071A-02).....	26
*EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	113
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
*OAO 3, STELLAR X RAYS (72-065A-02).....	66
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145
*UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	87
BRACE, L.H. - NASA-GSFC, GREENBELT, MD *AE-E, CYLINDRICAL ELECTROSTATIC PROBE (CEP) (75-107A-01).....	12
*DYNAMICS EXPLORER 2, LANGMUIR PROBE (81-070B-09).....	20
*ISIS 1, CYLINDRICAL ELECTROSTATIC PROBE (69-009A-07).....	50
*PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	75
*VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
BRANDHORST, JR., H.W. - NASA-LERC, CLEVELAND, OH *SPACE SHUTTLE LDEF-A, ADVANCED PHOTOVOLTAIC EXPERIMENT (SSLDEF -02).....	140
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	145
BRANDT, J.C. - NASA-GSFC, GREENBELT, MD SMM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	80
*ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
BRANDT, T. - KRUPP KRANKEN-ANGSTALN, ESSEN, FED REP OF GERMANY SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-01).....	151
GRECKINRIDGE, J. - NASA-JPL, PASADENA, CA SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
BREIG, E.L. - U OF TEXAS, DALLAS, RICHARDSON, TX UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
BRENKLE, J.P. - NASA-JPL, PASADENA, CA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
BRIDGE, H.S. - MASS INST OF TECH, CAMBRIDGE, MA *IMP-J, SOLAR PLASMA FARADAY CUP (73-078A-02).....	40
*PIONEER 6, SOLAR WIND PLASMA FARADAY CUP (65-105A-02).....	67
*VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
*VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
BRIGGS, G.A. - NASA HEADQUARTERS, WASHINGTON, DC VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
BRINKMAN, A.C. - U OF UTRECHT, UTRECHT, NETHERLANDS EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	113
BWINTON, H.C. - NASA-GSFC, GREENBELT, MD *AE-E, BENNETT ION-MASS SPECTROMETER (BIMS) (75-107A-10).....	12
OS5-1, PLASMA DIAGNOSTIC PACKAGE (SMOFT-4-01).....	134
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	154
BROADFOOT, A.L. - U OF SOUTHERN CALIF, TUCSON, AZ SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
*VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
*VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
BROGLIO, L. - NATL RES COUNCIL ITALY, ROME, ITALY *SAN MARCO-D/L, DRAG BALANCE AND AIR DENSITY (SM-DL -01).....	136
*SAN MARCO-D/M, IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT (SM-DM -01).....	138
BROOK, M. - NM INST OF MINE & TECH, SOCORRO, NM OSTA-1, NIGHT/DAY OPTICAL SURVEY OF LIGHTING (OSTA-1 -06).....	136
BROOME, G.C. - NASA-LARC, HAMPTON, VA *NOAA-F, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (NOAA-F -05).....	138
*NOAA-G, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (NOAA-G -05).....	132
BROWLIE, G. - U COLLEGE LONDON, LONDON, ENGLAND SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145
BROWN, A.M. - U OF PENNSYLVANIA, PHILADELPHIA, PA *OSTA-1, REFLEX BIOENGINEERING TEST (HBT) (OSTA-1 -07).....	135
*SPACELAB 1, MUTATION OF HELIANTHUS ANNUUS (SPALAB1-12).....	146
BROWN, M.E. - NASA-JPL, PASADENA, CA OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135

INVESTIGATORS AND EXPERIMENTS

PAGE

BROWN, JR., W.E. - NASA-JPL, PASADENA, CA PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	77
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
BROWNLEE, D.E. - U OF WASHINGTON, SEATTLE, WA SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIDS (SSLDEF -51).....	141
BRUECKNER, G.E. - US NAVAL RESEARCH LAB, WASHINGTON, DC *OSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SMOFT-4-03).....	133
*SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	132
*SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11).....	132
*UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08).....	139
*UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -08).....	164
BRUNER, JR., E.C. - LOCKHEED PALO ALTO, PALO ALTO, CA SMR, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	88
BRyant, D.A. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND UOSAT, CHARGED PARTICLE (UOSAT -03).....	169
BUCKER, H. - DFVLR, FRANKFURT, FED REP OF GERMANY *SPACE SHUTTLE LDEF-A, FREE FLYER BIOTACK (SSLDEF -50).....	140
*SPACELAB 1, ADVANCED BIOTACK EXPERIMENT (SPALAB1-32).....	147
BUNLER, F. - U OF BERNE, BERNE, SWITZERLAND SPACE SHUTTLE LDEF-A, INTERSTELLAR GAS (SSLDEF -48).....	142
BURBIDGE, E.M. - U OF CALIF, SAN DIEGO, LA JOLLA, CA ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	158
BURCH, J.L. - SOUTHWEST RES INST, SAN ANTONIO, TX *DYNAMICS EXPLORER 1, HIGH ALTITUDE PLASMA INSTRUMENT (81-070A-05).....	18
*DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INSTRUMENT (81-070B-08).....	23
*DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (81-070B-13).....	22
*SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPA) (SPALAB1-02).....	149
*UARS-1, PARTICLE ENVIRONMENT MONITOR (PER) (UARS-1 -07).....	163
*UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	168
BURLAGA, L.F. - NASA-GSFC, GREENBELT, MD *HELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	38
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	93
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	95
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
BURROWS, J.R. - NATL RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA ISIS 1, ENERGETIC PARTICLE DETECTORS (69-009A-04).....	50
ISIS 2, ENERGETIC PARTICLE DETECTORS (71-024A-04).....	52
BYRNK, B. - DANISH SPACE RES INST, LYNGBY, DENMARK HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
CANILL, JR., L.J. - U OF MINNESOTA, MINNEAPOLIS, MN *DYNAMICS EXPLORER 1, MAGNETIC FIELD OBSERVATIONS (81-070A-01).....	20
*DYNAMICS EXPLORER 2, MAGNETIC FIELD OBSERVATIONS (81-070B-01).....	23
CAIN, D.L. - NASA-JPL, PASADENA, CA PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	71
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	74
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
CALMOUN, L.D. - MCDONNELL-DOUGLAS CORP, ST. LOUIS, MO *SPACE SHUTTLE LDEF-A, CASCADE VARIABLE CONDUCTANCE HEAT PIPE (SSLDEF -39).....	140
CALLA, O.P.N. - SPACE APPLICATIONS CTR, AHMEDABAD, INDIA *BHASKARA, SATELLITE MICROWAVE RADIOMETER (SAMIR) (79-051A-01).....	15
CALLAHAN, P.S. - NASA-JPL, PASADENA, CA ISPR/ESA, RADIO SCIENCE (ISPESA -09).....	124
CALLEN, W.R. - GEORGIA INST OF TECH, ATLANTA, GA *SPACE SHUTTLE LDEF-A, SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS (SSLDEF -08).....	140
CALVERT, W. - U OF IOWA, IOWA CITY, IA *ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02).....	50
*ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	52
CAMPBELL, W.J. - US GEOLOGICAL SURVEY, TACOMA, WA *NIMBUS 7, SCANNING MULTISPECTRAL MICROCAVE RADIOMETER (SMNR) (78-098A-08).....	62
CANDIDI, M. - CNR, SPACE PLASMA LAB, ROME, ITALY ESA-GEOS 2, TRIAXIAL FLUXGATE MAGNETOMETER (78-071A-09).....	24
CANTARANO, S.C. - CNR, SPACE PLASMA LAB, ROME, ITALY *HELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	38
ISEE 2, SOLAR WIND IONS (77-102B-02).....	46
CANTIN, M. - CENS, SACLAY, FRANCE HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
CARAVANE COLLABOR. SEE APPENDIX B2 *COS-B, GAMMA-RAY ASTRONOMY SPARK CHAMBER EXPERIMENT (25 - 1000 MEV) (75-072A-01).....	16
CAHEY, W.C. - U OF KENT, CANTERBURY, KENT, ENGLAND SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -51).....	142

CARIGNAN, G.R. - U OF MICHIGAN, ANN ARBOR, MI	
AE-E, NEUTRAL ATMOSPHERE COMPOSITION (NACE) (75-107A-08).....	14
AE-E, NEUTRAL ATMOSPHERE TEMPERATURE (NATE) (75-107A-09).....	15
AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11).....	18
DYNAMICS EXPLORER 1, RETARDING ION MASS SPECTROMETER (81-070A-04).....	13
DYNAMICS EXPLORER 2, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (81-070B-03).....	21
DYNAMICS EXPLORER 2, WIND AND TEMPERATURE SPECTROMETER (81-070B-04).....	22
DYNAMICS EXPLORER 2, FABRY-PEROT INTERFEROMETER (81-070B-05).....	21
DYNAMICS EXPLORER 2, LANGMUIR PROBE (81-070B-09).....	20
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	118
PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11).....	76
SAN MARCO-D/L, WIND AND TEMPERATURE SPECTROMETER (WATS) (SM-DL -04).....	137
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
CARLSON, R.W. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
PIONEER 10, ULTRAVIOLET PHOTOMETRY (72-012A-06).....	71
PIONEER 11, ULTRAVIOLET PHOTOMETRY (73-019A-06).....	73
UARS-1, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	160
UARS-2, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	164
CAROVILLANO, R.L. - BOSTON COLLEGE, CHESTNUT HILL, MA	
DYNAMICS EXPLORER 1, GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (81-070A-03).....	19
CARPENTER, D.L. - STANFORD U, PALO ALTO, CA	
DYNAMICS EXPLORER 1, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (81-070A-08).....	19
CARPENTER, G.F. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	155
CARR, M.H. - US GEOLOGICAL SURVEY, MENLO PARK, CA	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
CARR, T.D. - U OF FLORIDA, GAINESVILLE, FL	
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
CASSOU, R.M. - U OF CALIF, SAN FRANC., SAN FRANCISCO, CA	
SPACELAB 1, HZE-PARTICLE DOSIMETRY (SPALAB1-11).....	146
CATURA, R.C. - LOCKHEED PALO ALTO, PALO ALTO, CA	
SMN, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	79
CAUFFMAN, D.P. - LOCKHEED PALO ALTO, PALO ALTO, CA	
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	44
CEALLAIGH, C.O. - DUBLIN INST ADV STUDY, DUBLIN, IRELAND	
SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	143
CERULLI, P. - CNR, SPACE PLASMA LAB, ROME, ITALY	
ISEE 2, SOLAR WIND IONS (77-102B-02).....	46
CHAGNON, C.W. - USAF GEOPHYS LAB, BEDFORD, MA	
AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
CHAHINE, M.T. - NASA-JPL, PASADENA, CA	
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
CHAMEIDES, W.L. - GEORGIA INST OF TECH, ATLANTA, GA	
OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
CHAMPION, K.S.W. - USAF GEOPHYS LAB, BEDFORD, MA	
AE-E, ATMOSPHERIC DENSITY ACCELEROMETER (MESA) (75-107A-02).....	13
CHAN, K.L. - NASA-ARC, MOFFETT FIELD, CA	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	51
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	53
CHANAN, G.A. - COLUMBIA U, NEW YORK, NY	
OSS-1, SOLAR FLARE X-RAY POLARIMETER EXPERIMENT (SNOFT-4-02).....	134
CHANDRA, S.S. - NASA-GSFC, GREENBELT, MD	
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	163
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	160
CHANG, J.S. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA	
UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	160
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	164
CHAPMAN, C.R. - PLANETARY SCIENCE INST, TUCSON, AZ	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
CHAPMAN, D.K. - U OF PENNSYLVANIA, PHILADELPHIA, PA	
SPACELAB 1, MUTATION OF HELIANTHUS ANNUUS (SPALAB1-12).....	146
CHAPMAN, R.D. - NASA-GSFC, GREENBELT, MD	
SMN, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	60
CHAPPELL, C.R. - NASA-MSFC, HUNTSVILLE, AL	
DYNAMICS EXPLORER 1, RETARDING ION MASS SPECTROMETER (81-070A-04).....	12
ISEE 1, ION COMPOSITION (77-102A-12).....	45
SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	149
CHASE, JR., S.C. - SANTA BARBARA RES CTR, GOLETA, CA	

INVESTIGATORS AND EXPERIMENTS

	PAGE
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	73
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (ITRM) (75-075A-02).....	91
CHEN, J.P. - U OF TENNESSEE, KNOXVILLE, TN SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
CHRISTENSEN, E.M. - NASA-JPL, PASADENA, CA VOIR, RADIOMETRY ALTIMETRY GRAVITY (RAGE) (VOIR -03).....	171
CHUPP, E.L. - U OF NEW HAMPSHIRE, DURHAM, NH *SMM, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
CICERONE, R.J. - U OF CALIF, SAN DIEGO, LA JOLLA, CA UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	163
UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	160
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	168
UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	165
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	168
CLARK, D. - NOAA-NESS, SUITLAND, MD NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
CLARK, G.W. - MASS INST OF TECH, CAMBRIDGE, MA HEAO 2, MONITOR PROPORTIONAL COUNTER (MPC) (78-103A-01).....	35
HEAO 2, HIGH-RESOLUTION IMAGER (HRI) (78-103A-02).....	35
HEAO 2, FOCAL PLANE CRYSTAL SPECTROMETER (FPCS) (78-103A-03).....	35
HEAO 2, IMAGING PROPORTIONAL COUNTER (IPC) (78-103A-04).....	35
CLARK, I.O. - NASA-LARC, HAMPTON, VA SPACE SHUTTLE LDEF-A, EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS (SSLDEF -18).....	143
CLAYTON, D.D. - RICE U, HOUSTON, TX GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	119
CLIFTON, K.S. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	149
CLINE, T.L. - NASA-GSFC, GREENBELT, MD *ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	43
ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	49
*ISPM/NASA, SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SKR) (ISPMASA-02).....	125
SMM, HARD X-RAY BURST SPECTROMETER (HXRBS) (80-014A-06).....	79
CLOUTIER, P.A. - RICE U, HOUSTON, TX PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
CODE, A.D. - U OF WISCONSIN, MADISON, WI ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	157
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	158
COFFEE, JR., C.W. - NASA-LARC, HAMPTON, VA ERBS-A, HALOGEN OCCULTATION (HALOE) (ERBS-A -03).....	110
COFFEEN, D.L. - NASA-GISS, NEW YORK, NY GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	115
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	76
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	95
COFFEY, M.T. - NATL CTR FOR ATMOS RES, BOULDER, CO UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
COGOLI, A. - U OF ZURICH, ZURICH, SWITZERLAND *SPACELAB 1, LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS (SPALAB1-36).....	147
COHEN, H.A. - USAF GEOPHYS LAB, BEDFORD, MA *STP P78-2, ELECTRON GUN-ION GUN (79-007A-07).....	84
COLBURN, D.S. - NASA-ARC, MOFFETT FIELD, CA PIONEER 9, TRIAXIAL MAGNETOMETER (68-100A-01).....	69
PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	74
COLE, K.D. - LA TROBE U, BUNDOORA, AUSTRALIA DYNAMICS EXPLORER 2, LANGMUIR PROBE (81-070B-09).....	20
COLEMAN, JR., F.J. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, MAGNETOMETER (JOPO -03).....	115
PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	74
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	77
COLLARD, M.R. - NASA-ARC, MOFFETT FIELD, CA PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-10).....	77
COLLINS, D.J. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-15).....	193
CONNER, J.P. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75
CONNES, P. - PARIS OBSERVATORY, MEUDON, FRANCE SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-28).....	150
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	163
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	160

INVESTIGATORS AND EXPERIMENTS

PAGE

CONRATH, D.J. - NASA-GSFC, GREENBELT, MD VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
COOK, A.F. - SAO, CAMBRIDGE, MA VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
COOPER, J.E. - NASA-LARC, HAMPTON, VA EROS-A, EARTH RADIATION BUDGET EXPERIMENT (ERBE) (ERBS-A -01).....	110
COPLAN, M.A. - U OF MARYLAND, COLLEGE PARK, MD ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	48
CORONITI, F.V. - U OF CALIF, LA, LOS ANGELES, CA DYNAMICS EXPLORER 1, AURORAL PHYSICS (81-070A-07).....	19
GALILEO ORBITER, PLASMA (IOPD -04).....	114
ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	45
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	77
COSTOGHE, E.M. - NASA-JPL, PASADENA, CA SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	145
COTE, C.E. - NASA-GSFC, GREENBELT, MD NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	61
COULSON, K.L. - U OF CALIF, DAVIS, DAVIS, CA NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
COURTES, G.C. - CNRS-LAS, MARSEILLE, FRANCE SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	146
SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	147
COUTURIER, P. - PARIS OBSERVATORY, MEUDON, FRANCE ISEE 3, RADIO MAPPING (78-079A-10).....	49
COWLES, J.R. - U OF HOUSTON, HOUSTON, TX OSS-1, INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS (SHOFT-4-07).....	133
SPACELAB 2, INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION (SPALAB2-02).....	152
COWSIK, R. - TATA INST OF FUND RES, BOMBAY, INDIA SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	155
CRANE, P. - EUROP SO OBS, SWITZ, GENEVA, SWITZERLAND ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	158
CRIFO, J.F. - CNRS-LPSP, VERRIERES-LE-BUISSON, FRANCE SPACE SHUTTLE LDEF-A, THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE (SSLDEF -40).....	141
CRIS-STAFF, CNES, TOULOUSE, FRANCE SPOT, HIGH RESOLUTION VISIBLE IMAGER (SPOT -01).....	157
CROFT, T.A. - SRI INTERNATIONAL, MENLO PARK, CA PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	69
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	75
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
CROMHELYNCK, D. - ROY METEOROL INST BELG, BRUSSELS, BELGIUM SPACELAB 1, ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT (SPALAB1-26).....	147
CROOK, G.M. - GAINES M. CROOK ASSOC, CANOGA PARK, CA PIONEER 9, PLASMA WAVE DETECTOR (68-100A-07).....	69
CROSBY, W.M. - SCRIPPS C&R FOUNDATION, LA JOLLA, CA SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
CROUCH, R.K. - NASA-LARC, HAMPTON, VA SPACE SHUTTLE LDEF-A, EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS (SSLDEF -10).....	143
CRUIKSHANK, D.P. - U OF HAWAII, HONOLULU, HI VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
CRUISE, A.M. - U COLLEGE LONDON, LONDON, ENGLAND UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	87
CRUTZEN, P.J. - NATL CTR FOR ATMOS RES, BOULDER, CO SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PHOTON ALARM (SME -06).....	139
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	163
UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	168
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	168
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	168
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	168
UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	165
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
CULHANE, J.L. - U COLLEGE LONDON, LONDON, ENGLAND SMM, SOFT X-RAY POLYCHROMATOR (SRP) (80-014A-04).....	74
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145

INVESTIGATORS AND EXPERIMENTS

PAGE

*SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	153
CUNNOLD, D.M. - GEORGIA INST OF TECH, ATLANTA, GA	
NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SDUV/TOMS) (78-098A-09).....	62
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	76
*UARS-1, PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE (UARS-1 -10).....	160
CUNNOLD, D.M. - MASS INST OF TECH, CAMBRIDGE, MA	
*UARS-2, PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE (UARS-2 -10).....	165
CURRIE, D.G. - U OF MARYLAND, COLLEGE PARK, MD	
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	190
CURTIS, P. - OXFORD U, OXFORD, ENGLAND	
NIMBUS 6, PRESSURE MODULATED RADIOMETER (PMR) (75-092A-09).....	61
CUTTS, J.A. - SCIENCE APPL, INC, PASADENA, CA	
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
D'ANGELO, N. - U OF IOWA, IOWA CITY, IA	
OS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	134
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	154
DAHL, A.O. - U OF PENNSYLVANIA, PHILADELPHIA, PA	
SPACELAB 1, MUTATION OF HELIANTHUS ANNUUS (SPALAB1-12).....	146
DALGARNO, A. - SAO, CAMBRIDGE, MA	
AE-E, CYLINDRICAL ELECTROSTATIC PROBE (CEP) (75-107A-01).....	12
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
DANIELSON, G.E. - CALIF INST OF TECH, PASADENA, CA	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	150
VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
DAROSA, A.V. - STANFORD U, PALO ALTO, CA	
*SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
DAVE, J.V. - IBM CORPORATION, PALO ALTO, CA	
NIMBUS 4, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (78-025A-05).....	59
DAVIDSEN, A.F. - JOHNS HOPKINS U, BALTIMORE, MD	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	150
DAVIES, D.W. - NASA-JPL, PASADENA, CA	
VIKING 1 ORBITER, MARS ATMOSPHERIC WATER DETECTION (MAWD) (75-075A-03).....	91
DAVIES, J.G. - U OF MANCHESTER, MANCHESTER, ENGLAND	
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
DAVIES, K.W. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
DAVIES, M.E. - RAND CORP, SANTA MONICA, CA	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
DAVIS, JR., L. - CALIF INST OF TECH, PASADENA, CA	
ISEE 3, MAGNETIC FIELDS (78-079A-02).....	48
PIONEER 11, MAGNETIC FIELDS (75-019A-01).....	74
DE JAGER, C. - U OF UTRECHT, UTRECHT, NETHERLANDS	
EROSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EROSAT -02).....	113
ISEE 3, ENERGETIC PROTONS (78-079A-06).....	48
*SMM, HARD X-RAY IMAGING SPECTROMETER (HMS) (80-014A-05).....	79
DE LUCA, M.F. - U OF WISCONSIN, MADISON, WI	
SPACELAB 2, VITAMIN D METABOLITES AND BONE DEMINERALIZATION (SPALAB2-01).....	154
DEERENBERG, A.J.M. - U OF LEIDEN, LEIDEN, NETHERLANDS	
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
DEFOREST, S.F. - INT REMOTE SYS, CHAPSWORTH, CA	
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	114
DEHARVENG, J.M. - CNRS-LAS, MARSEILLE, FRANCE	
SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	146
ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	150
DENNEL, G. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY	
GALILEO PROBE, LIGHTNING (JOP -06).....	117
HELIOS-A, SEARCH COIL MAGNETOMETER (74-097A-03).....	30
DELLA, R.J. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY	
*SPACE SHUTTLE LDEF-A, EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS (SSLEDF -20).....	141
DELLWIG, L.F. - U OF KANSAS, LAWRENCE, KS	
OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
DINNIS, W.R. - NASA-GSFC, GREENBELT, MD	
SMM, HARD X-RAY GUSTY SPECTROMETER (HMRBS) (80-014A-06).....	79
DESAI, U.D. - NASA-GSFC, GREENBELT, MD	

SMM, HARD X-RAY BURST SPECTROMETER (HNRBS) (80-014A-04).....	79
DICHGANS, J. - U OF FREIDBURG, FREIDBURG, FED REP OF GERMANY SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-01).....	101
DICKINSON, D.E. - NATL CTR FOR ATMOS RES, BOULDER, CO SME, UV OZONE (SME -01).....	130
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	130
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	130
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	130
SME, SOLAR UV MONITOR (SME -05).....	130
SME, SOLAR PROTON ALARM (SME -06).....	130
DIETERLE, G. - ESA-TOULOUSE, TOULOUSE, FRANCE METEOSAT 1, DATA COLLECTION PLATFORM (DCP) (77-108A-02).....	90
METEOSAT 2, DATA COLLECTION PLATFORM (DCP) (81-057A-02).....	99
DISNEY, M.J. - U COLLEGE CARDIFF, CARDIFF, WALES ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	150
DOERING, J.P. - JOHNS HOPKINS U, BALTIMORE, MD AE-E, PHOTOELECTRON SPECTROMETER (PES) (75-107A-03).....	13
DONE, T. - NASEDA U, SHINJUKU-CU, JAPAN EXOS-C, MONITOR OF HIGH ENERGY PARTICLES (EXOS-C -00).....	111
DOMINGO, V. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ISSE 3, ENERGETIC PROTONS (78-079A-08).....	46
SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -09).....	143
SPACELAB 1, ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT (SPALAB1-26).....	147
DONAHUE, T.M. - U OF MICHIGAN, ANN ARBOR, MI DYNAMICS EXPLORER 2, FABRY-PEROT INTERFEROMETER (81-0700-05).....	21
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	110
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	75
PIONEER VENUS 1, PARTICIPATING THEORIST DONAHUE (78-051A-04).....	75
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	160
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
DONLEY, J.L. - NASA-GSFC, GREENBELT, MD ISIS 2, RETARDING POTENTIAL ANALYZER (71-024A-00).....	52
PONNELLY, R.F. - NOAA-ERL, BOULDER, CO GOES 1, SOLAR X-RAY MONITOR (75-100A-03).....	29
GOES 2, SOLAR X-RAY MONITOR (77-048A-03).....	30
GOES 3, SOLAR X-RAY MONITOR (78-062A-03).....	31
GOES 4, SOLAR X-RAY MONITOR (80-074A-03).....	32
GOES 5, SOLAR X-RAY MONITOR (81-0-9A-03).....	34
GOES-F, SOLAR X-RAY MONITOR (GOES-F -03).....	122
SMS 1, SOLAR X-RAY MONITOR (74-033A-03).....	81
SMS 2, SOLAR X-RAY MONITOR (75-011A-02).....	82
DOSCHER, G.A. - US NAVAL RESEARCH LAB, WASHINGTON, DC STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	83
DRATSON, S.R. - U OF MICHIGAN, ANN ARBOR, MI UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	163
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	160
DRUMMOND, A.J. (DECEASED)-EPPLEY LAB, INC, NEWPORT, RI NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	61
DUBOIN, M.L. - CNET, ISSY LES MOULINEAUX, FRANCE SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	150
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	163
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	160
DUENEN, W.M. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	160
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	164
DULK, G.A. - U OF COLORADO, BOULDER, CO SMM, CORONAGRAPH/POLARIMETER (80-014A-01).....	90
DUNCAN, H.J. - NASA-WSPC, HUNTSVILLE, AL SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	149
DUNCOMBE, R.L. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, ASTROMETRY SCIENCE (LST -09).....	150
DUNN, C.D.R. - U OF TENNESSEE, KNOXVILLE, TN SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON RHYTHMOKINETICS IN MAN (SPALAB1-14).....	149
DUNN, T.C. - NASA-JPL, PASADENA, CA VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
DYAL, P. - NASA-ARC, MOFFETT FIELD, CA PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	74
DYER, C. - ROYAL NAVAL COLLEGE, LONDON, ENGLAND GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (LRO -02).....	119
DYAGAPRASAD, N. - TATA INST OF FUND RES, BOMBAY, INDIA SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-19).....	155

EATHER, R.M. - BOSTON COLLEGE, CHESTNUT HILL, MA DYNAMICS EXPLORER 1, GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (01-070A-03).....	19
SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	109
EDERHARDT, P.H. - U OF BERNE, BERNE, SWITZERLAND CCS, PLASMA COMPOSITION (CCS -01).....	102
DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (01-070A-06).....	19
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (76-071A-03).....	84
ISEE 1, ION COMPOSITION (77-102A-12).....	05
EDLSTEIN, P. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LOEF-A, TRANSVERSE PLAT HEAT PIPE PERFORMANCE (LSDEF -37).....	103
EDGERTON, A.T. - AERDJET ELECTROSYSTEMS, AZUSA, CA NIMBUS 6, ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) (75-092A-03).....	62
EGIDI, A. - CNR, SPACE PLASMA LAB, ROME, ITALY ISEE 2, SOLAR WIND IONS (77-1020-02).....	46
EJIRI, M. - U OF TOKYO, TOKYO, JAPAN JIKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-007A-04).....	95
EL-SAYED, S.Z. - TEXAS A&M, COLLEGE STATION, TX NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-090A-03).....	63
ELACHI, C. - NASA-JPL, PASADENA, CA OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
ELLENAN, D.D. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	191
ELLIOT, M. - IMPERIAL COLLEGE, LONDON, ENGLAND ISEE 3, ENERGETIC PROTONS (78-079A-08).....	40
ELLIOT, J.L. - CORNELL U, ITHACA, NY ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	157
ENGE, M. - INST P-A NUCLEAR PHYS, KIEL, FED REP OF GERMANY SPACELAB 1, ISOTOPE STICK (SPALAB1-29).....	146
ENGLAND, A.W. - NASA-JSC, HOUSTON, TX OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
ENGLEMAN, J.J. - CENS, SACLAY, FRANCE HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (77-082A-04).....	36
ESA STAFF ESA-ESTEC, NOORDWIJK, NETHERLANDS SPACELAB 1, METRIC CAMERA FACILITY (SPALAB1-30).....	147
SPACELAB 1, MICROWAVE FACILITY (SPALAB1-39).....	147
SPACELAB 1, SPACE SLED FACILITY (SPALAB1-40).....	47
SPACELAB 1, SPACE PROCESSING LABORATORY (SPALAB1-42).....	140
ESHLERMAN, V.R. - STANFORD U, PALO ALTO, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	69
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
ESPOSITO, L. - U OF COLORADO, BOULDER, CO VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	95
ESPOSITO, P.B. - NASA-JPL, PASADENA, CA ISPM/ESA, RADIO SCIENCE (ISPESA -09).....	124
ESTABROOK, F.B. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
ESTULIN, I.V. - IKI, MOSCOW, USSR VENERA 11, GAMMA-RAY SPECTROMETER (78-084A-01).....	88
VENERA 12, GAMMA-RAY SPECTROMETER (78-086A-01).....	89
ETCHETO, J.M. - CNET, ISEY-LFS-MOULINEAUX, FRANCE ESA-GEOS 2, MAGNETIC WAVE FIELDS (78-071A-06).....	24
ISEE 1, PLASMA DENSITY (77-102A-00).....	44
ISEE 2, RADIO PROPAGATION (77-1020-06).....	46
FUCCARO, D. - U OF TEXAS, DALLAS, RICHARDSON, TX VOIR, VENUS IONOSPHERE DYNAMICS (VOIR -02).....	170
EVANS, D.S. - NOAA-ERL, BOULDER, CO NOAA 6, SPACE ENVIRONMENT MONITOR (79-057A-04).....	65
TIROS-N, SPACE ENVIRONMENT MONITOR (78-096A-04).....	87
EVANS, W.D. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM ISEE 3, X- AND GAMMA-RAY BURSTS (78-079A-14).....	47
PIONEER VENUS 1, TRANSMITTED GAMMA-RAY SOURCES (78-051A-05).....	75
EVENSON, P. - U OF CHICAGO, CHICAGO, IL ISEE 3, COSMIC-RAY ELECTRONS AND NUCLEI (78-079A-06).....	48
EYLES, C.J. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	155
FAINBERG, J. - NASA-GSFC, GREENBELT, MD ISEE 3, RADIO MAPPING (78-079A-10).....	49
FAIRFIELD, D.M. - NASA-GSFC, GREENBELT, MD	

ESA-GEOS 2, TRIAXIAL FLUXGATE MAGNETOMETER (78-071A-09).....	24
FAN, C.Y. - U OF ARIZONA, TUCSON, AZ	
IMP-J, SOLID-STATE DETECTORS (73-078A-03).....	41
ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	44
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48
*PIONEER 6, COSMIC-RAY TELESCOPE (65-105A-03).....	67
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
FANALE, P.P. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
*GALILEO ORBITER, FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES (JOPO -12).....	114
FARLEY, D.T. - CORNELL U, ITHACA, NY	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
FARMER, C.B. - NASA-JPL, PASADENA, CA	
*SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	159
*V KING 1 ORBITER, MARS ATMOSPHERIC WATER DETECTION (MAWD) (75-075A-03).....	91
FARTHNG, W.M. - NASA-GSFC, GREENBELT, MD	
DYNAMICS EXPLORER 1, MAGNETIC FIELD OBSERVATIONS (B1-070A-01).....	20
DYNAMICS EXPLORER 2, MAGNETIC FIELD OBSERVATIONS (B1-070B-01).....	23
MAGSAT, SCALAR MAGNETOMETER (79-094A-01).....	58
FAVALE, A.J. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
FAWCETT, B.C. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND	
SHM, SOFT X-RAY POLYCHROMATOR (XRP) (88-014A-04).....	79
FAZIO, G.G. - SAO, CAMBRIDGE, MA	
*SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
FECHTIG, H. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY	
GALILEO ORBITER, DUST (JOPO -09).....	115
*HELIOS-A, MICROMETEOROID DETECTOR AND ANALYZER (74-097A-12).....	37
FEINBERG, P.M. - NASA-GSFC, GREENBELT, MD	
*LANDSAT-D, GLOBAL POSITIONING SYSTEM (GPS) (LAND-D -03).....	127
*LANDSAT-D1, GLOBAL POSITIONING SYSTEM (GPS) (LAND-E -03).....	128
FELBECK, D.K. - U OF MICHIGAN, ANN ARBOR, MI	
*SPACE SHUTTLE LDEF-A, SPACE EXPOSURE INFLUENCE ON MECHANICAL PROPERTIES OF HI-TOUGHNESS GRAPHITE EPOXY (SSLDEF -06).....	141
FELDMAN, W.C. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	47
PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
FENNELL, J.F. - AEROSPACE CORP, EL SEGUNDO, CA	
*STP P78-2, SPACECRAFT SNEATH FIELDS DETECTOR (79-007A-06).....	84
FEREBEE, I.C. - U OF SURREY, GUILDFORD, SURREY, ENGLAND	
*UOSAT, CHARGED PARTICLE (UOSAT -03).....	169
FICHTEL, C.E. - NASA-GSFC, GREENBELT, MD	
*GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
FICHTL, G.H. - NASA-MSFC, HUNTSVILLE, AL	
*SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-08).....	148
*SPACELAB 3, GEOPHYSICAL FLUID FLOW CELL (GFFC) (SPALAB3-10).....	156
FILLIS, R.W. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	
*PIONEER 10, JOVIAN TRAPPED RADIATION (72-012A-05).....	70
*PIONEER 11, JOVIAN TRAPPED RADIATION (73-019A-05).....	73
FILZ, R.C. - USAF GEOPHYS LAB, BEDFORD, MA	
*SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	141
FINDLAY, J.A. - NASA-GSFC, GREENBELT, MD	
ISIS 1, CYLINDRICAL ELECTROSTATIC PROBE (69-009A-07).....	50
FINLEY, D. - U OF CALIF, BERKELEY, BERKELEY, CA	
STP P80-1, EXTREME ULTRAVIOLET PHOTOMETER (P80-1 -03).....	159
FISCHER, F. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY	
SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-DL -02).....	137
FISHMAN, G.J. - NASA-MSFC, HUNTSVILLE, AL	
*GAMMA-RAY OBSERVATORY, TRANSIENT-EVENT MONITOR (GRO -05).....	119
FISK, L.A. - U OF NEW HAMPSHIRE, DURHAM, NH	
ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	44
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48
ISEE 3, MEDIUM ENRGY COSMIC RAY (78-079A-04).....	49
FJELDBO, G. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	71
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	74
FLAMAND, J. - INSTRUMENT SA/JOBIN-R, LONGJUMEAU, FRANCE	
*SPACE SHUTTLE LDEF-A, RULED AND HOLOGRAPHIC GRATINGS (SSLDEF -42).....	141
FLASAR, F.M. - NASA-GSFC, GREENBELT, MD	

VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
FLAVILL, R.P. - U OF KENT, CANTERBURY, KENT, ENGLAND SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	142
FOPPL, H. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY IRM, LI AND BA RELEASE MODULE (IRM -01).....	123
FORD, H.C. - U OF CALIF, LA, LOS ANGELES, CA ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	138
FORESTIERI, A.F. - NASA-LERC, CLEVELAND, OH SPACE SHUTTLE LDEF-A, ADVANCED PHOTOVOLTAIC EXPERIMENT (SSLDEF -02).....	140
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	140
FORMISANO, V. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ISEE 2, SOLAR WIND IONS (77-102B-02).....	46
FORREST, D.J. - U OF NEW HAMPSHIRE, DURHAM, NH SMH, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
FOWLER, P.H. - U OF BRISTOL, BRISTOL, ENGLAND MUK 6, COSMIC RAY (79-047A-01).....	87
FOWLIS, W. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 3, GEOPHYSICAL FLUID FLOW CELL (GFFC) (SPALAB3-10).....	156
FRANK, L.A. - U OF IOWA, IOWA CITY, IA *DYNAMICS EXPLORER 1, GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (81-070A-03).....	19
*GALILEO ORBITER, PLASMA (JOPO -04).....	114
*IMP-J, MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS (73-078A-04).....	41
*ISEE 1, HOT PLASMA (77-102A-03).....	43
*ISEE 2, HOT PLASMA (77-102B-03).....	46
OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	134
PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	154
FRANZ, O.G. - LOWELL OBSERVATORY, FLAGSTAFF, AZ ST, ASTROMETRY SCIENCE (LST -09).....	158
FRASER, R.S. - NASA-GSFC, GREENBELT, MD OSTA-1, OCEAN COLOR (OCE) (OSTA-1 -05).....	135
FREDERICK, J.E. - NASA-GSFC, GREENBELT, MD UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	162
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	167
FREDERICKS, R.W. - TRW SYSTEMS GROUP, REDONDO BEACH, CA ISEE 1, PLASMA WAVES (77-102A-07).....	44
ISEE 2, PLASMA WAVES (77-102B-05).....	46
ISEE 3, PLASMA WAVES (78-079A-07).....	48
PIONEER 9, PLASMA WAVE DETECTOR (68-100A-07).....	69
FREDRICK, L.W. - U OF VIRGINIA, CHARLOTTESVILLE, VA ST, ASTROMETRY SCIENCE (LST -09).....	158
FRIEBEL, V. - BALL AEROSPACE SYS DIV, BOULDER, CO SPACE SHUTTLE LDEF-A, ORBITAL LUBRICATION EXPERIMENT (SSLDEF -25).....	140
FRIMONT, D. - BIRA, BRUSSELS, BELGIUM SPACELAB 1, GRILLE SPECTROMETER (SPALAB1-10).....	145
FRITZ, T.A. - NOAA-ERL, BOULDER, CO GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	47
FROST, K.J. - NASA-GSFC, GREENBELT, MD *SMH, HARD X-RAY BURST SPECTROMETER (HXRBS) (80-014A-06).....	79
FYFAT, A.L. - NASA-JPL, PASADENA, CA UARS-1, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	160
UARS-2, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	164
GABRIEL, A.M. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND *SMH, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	79
*SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	153
GADDY, E.M. - NASA-GSFC, GREENBELT, MD SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	145
GALICINAO, I.Y. - NASA-GSFC, GREENBELT, MD *GEOS 3, SATELLITE-TO-SATELLITE TRACKING (75-027A-06).....	26
GALLAGHER, J.J. - GEORGIA INST OF TECH, ATLANTA, GA SPACE SHUTTLE LDEF-A, EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS (SSLDEF -26).....	140
GARCIA-MUNOZ, M. - U OF CHICAGO, CHICAGO, IL IMP-J, SOLAR FLARE HIGH-Z/LOW-Z ISOTOPE (73-078A-07).....	42
GAUER, O.H. - U OF BERLIN, BERLIN, FED REP OF GERMANY *SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	148
*SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	148
GAUSE, R.L. - NASA-MSFC, HUNTSVILLE, AL *SPACELAB 1, TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL (SPALAB1-10).....	148

INVESTIGATORS AND EXPERIMENTS

PAGE

GAUTIER, D. - PARIS OBSERVATORY, MEUDON, FRANCE	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
GAYLORD, T.K. - GEORGIA INST OF TECH, ATLANTA, GA	
SPACE SHUTTLE LDEF-A, SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS (SSLDEF -08).....	140
GENRELS, T. - U OF ARIZONA, TUCSON, AZ	
*PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
*PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
GEISLER, J.E. - U OF MIAMI, MIAMI, FL	
UARS-1, OBSERV.ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-1 -20).....	160
UARS-2, OBSERV.ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-2 -20).....	165
GEISS, J. - U OF BERNE, BERNE, SWITZERLAND	
CCE, PLASMA COMPOSITION (CCE -01).....	102
DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (01-070A-06).....	19
*ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	24
ISEE 1, ION COMPOSITION (77-102A-12).....	45
ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	48
ISPM/ESA, SOLAR-WIND COMPOSITION SPECTROMETER (ISPESA -04).....	124
SPACE SHUTTLE LDEF-A, INTERSTELLAR GAS (SSLDEF -08).....	142
GELLER, M.A. - U OF MIAMI, MIAMI, FL	
UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	160
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
*UARS-1, OBSERV.ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-1 -20).....	160
UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	165
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
*UARS-2, OBSERV.ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-2 -20).....	165
GENDRIN, R.E. - CNET, ISSY-LES-MOULINEAUX, FRANCE	
*ESA-GEOS 2, MAGNETIC WAVE FIELDS (78-071A-06).....	24
GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -07).....	115
ISEE 1, PLASMA DENSITY (77-102A-08).....	44
ISEE 2, RADIO PROPAGATION (77-102B-06).....	46
GEOTZ, A.H. - NASA-JPL, PASADENA, CA	
*OSTA-1, SHUTTLE MULTISPECTRAL INFRARED RADIOMETER (SMIRR) (OSTA-1 -02).....	135
GERARD, E. - PARIS OBSERVATORY, MEUDON, FRANCE	
GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
GHIEMMETTI, A. - U OF BERNE, BERNE, SWITZERLAND	
CCE, PLASMA COMPOSITION (CCE -01).....	102
DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (01-070A-06).....	19
*ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	24
ISEE 1, ION COMPOSITION (77-102A-12).....	45
GIACCONI, R. - JOHNS HOPKINS U, BALTIMORE, MD	
*HEAO 2, MONITOR PROPORTIONAL COUNTER (MPC) (78-103A-01).....	35
*HEAO 2, HIGH-RESOLUTION IMAGER (HRI) (78-103A-02).....	35
*HEAO 2, FOCAL PLANE CRYSTAL SPECTROMETER (FPCS) (78-103A-03).....	35
*HEAO 2, IMAGING PROPORTIONAL COUNTER (IPC) (78-103A-04).....	35
GIERASCH, P.J. - CORNELL U, ITHACA, NY	
*GALILEO ORBITER, JOVIAN ATMOSPHERIC DYNAMICS (JOPO -13).....	114
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
GIESE, R.H. - RUHR-U BOCHUM, BOCHUM, FED REP OF GERMANY	
*ISPM/NASA, ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE) (ISPMASA-08).....	126
GILBERT, E.L. - NASA-GSFC, GREENBELT, MD	
*LANDSAT 3, DATA COLLECTION SYSTEM (DCS) (78-026A-03).....	57
GILLE, J.C. - NATL CTR FOR ATMOS RES, BOULDER, CO	
SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
*UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	160
*UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
*UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	165
*UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
GILMAN, P.A. - HIGH ALTITUDE OBS, BOULDER, CO	
SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-08).....	148
SPACELAB 3, GEOPHYSICAL FLUID FLOW CELL (GFPC) (SPALAB3-10).....	156
GIOVANE, F. - U OF FLORIDA, GAINESVILLE, FL	
OSS-1, CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE (SHOFT-4-06).....	134
GIRARD, A. - ONERA, CHATILLON, FRANCE	
SPACELAB 1, GRILLIE SPECTROMETER (SPALAB1-10).....	145
GLEIM, F.O. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY	
GALILEO PROBE, LIGHTNING (JOP -06).....	117
GLOECKLER, G. - U OF MARYLAND, COLLEGE PARK, MD	
*CCE, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCE -03).....	101
*IMP-J, SOLID-STATE DETECTORS (73-078A-03).....	41
ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	44
ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	43
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48

ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	49
*ISPH/ESA, SOLAR-WIND COMPOSITION SPECTROMETER (ISPESA -04).....	124
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
GLOERSEN, P. - NASA-GSFC, GREENBELT, MD	
NIMBUS 5, ELECTRICALLY SCANNING MICROWAVE RADIONETER (ESMR) (72-097A-04).....	60
*NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIONETER (SMWR) (78-098A-08).....	62
GOERTZ, C.K. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
GOLDMAN, A. - U OF DENVER, DENVER, CO	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	162
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	167
GOLDSTEIN, R.M. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	114
OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-0-04).....	133
*PIONEER 6, SPECTRAL BROADENING (65-105A-09).....	67
GONFALONE, A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	114
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
GOODALL, C.V. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	87
GOODY, R.M. - HARVARD U, CAMBRIDGE, MA	
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
GORDON, H.R. - NOAA-PHEL, SEATTLE, WA	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
GORED, P. - CENS, SACLAY, FRANCE	
MEAO 3, ISOTOPIAL COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
GRAMS, G.W. - GEORGIA INST OF TECH, ATLANTA, GA	
GALILEO PROBE, NEPHELOMETER (JOP -05).....	118
NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II) (78-098A-06).....	64
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
GRARD, R.J.L. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	25
*GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	114
ISEE 1, PLASMA DENSITY (77-102A-08).....	44
ISEE 2, RADIO PROPAGATION (77-102B-06).....	46
GRAYSTONE, P. - METEOROLOGICAL OFFICE, LONDON, ENGLAND	
*UARS-1, THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE (UARS-1 -25).....	161
*UARS-2, THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE (UARS-2 -25).....	165
GREELEY, R. - ARIZONA STATE U, TUCSON, AZ	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
GREEN, A.E.S. - U OF FLORIDA, GAINESVILLE, FL	
NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	62
GREEN, G. - U OF KIEL, KIEL, FED REP OF GERMANY	
HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	38
GREEN, H.L. - CLINICAL RES CENTER, HARROW, MIDDLESEX, ENGLAND	
*SPACELAB 1, ELECTRO-PHYSIOLOGICAL TAPE RECORDER (SPALAB1-35).....	148
GREEN, I.M. - TRW SYSTEMS GROUP, REDONDO BEACH, CA	
PIONEER 9, PLASMA WAVE DETECTOR (68-100A-07).....	69
PIONEER VENUS 1, ELECTRIC FIELD DETECTOR (78-051A-13).....	77
GREENBERG, R. - PLANETARY SCIENCE INST, TUCSON, AZ	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
GREENSTADT, E.W. - TRW SYSTEMS GROUP, REDONDO BEACH, CA	
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	45
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	46
GREGORY, J.C. - U OF ALABAMA, HUNTSVILLE, AL	
*SPACE SHUTTLE LDEF-A, THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE (SSLDEF -19).....	142
GREINER, D.E. - U OF CALIF, BERKELEY, BERKELEY, CA	
ISEE 3, HIGH-ENERGY COSMIC RAY (78-079A-05).....	47
GRIFFIN, F.J. - EPPLBY LAB, INC, NEWPORT, RI	
SPACE SHUTTLE LDEF-A, PASSIVE EXPOSURE OF EARTH RADIATION BUDGET EXPERIMENT COMPONENTS (SSLDEF -27).....	141
GRINGAUZ, K.I. - IKI, MOSCOW, USSR	
*VENERA 11, RETARDING POTENTIAL TRAPS (78-084A-02).....	88
*VENERA 12, RETARDING POTENTIAL TRAPS (78-086A-02).....	89
GROSE, W.L. - NASA-LARC, HAMPTON, VA	
*UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-1 -22).....	161
*UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-2 -22).....	165
GROSSI, M.D. - RAYTHEON CORP, SUDBURY, MA	
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	98
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91

GRUMB, R.N. - NOAA-ERL, BOULDER, CO	
GOES 1, ENERGETIC PARTICLE MONITOR (75-100A-02).....	29
GOES 1, SOLAR X-RAY MONITOR (75-100A-03).....	29
GOES 1, MAGNETIC FIELD MONITOR (75-100A-04).....	29
GOES 2, ENERGETIC PARTICLE MONITOR (77-048A-02).....	30
GOES 2, SOLAR X-RAY MONITOR (77-048A-03).....	30
GOES 2, MAGNETIC FIELD MONITOR (77-048A-04).....	30
GOES 3, ENERGETIC PARTICLE MONITOR (78-062A-02).....	31
GOES 3, SOLAR X-RAY MONITOR (78-062A-03).....	31
GOES 3, MAGNETIC FIELD MONITOR (78-062A-04).....	31
GOES 4, ENERGETIC PARTICLE MONITOR (80-074A-02).....	32
GOES 4, SOLAR X-RAY MONITOR (80-074A-03).....	32
GOES 4, MAGNETIC FIELD MONITOR (80-074A-04).....	32
GOES 5, ENERGETIC PARTICLE MONITOR (81-049A-02).....	33
GOES 5, MAGNETIC FIELD MONITOR (81-049A-04).....	34
NOAA 6, SPACE ENVIRONMENT MONITOR (79-057A-04).....	65
NOAA 7, SPACE ENVIRONMENT MONITOR (81-059A-04).....	66
SMS 1, ENERGETIC PARTICLE MONITOR (74-033A-02).....	81
SMS 1, SOLAR X-RAY MONITOR (74-033A-03).....	81
SMS 2, ENERGETIC PARTICLE MONITOR (75-011A-01).....	82
SMS 2, SOLAR X-RAY MONITOR (75-011A-02).....	82
SMS 2, MAGNETIC FIELD MONITOR (75-011A-03).....	82
TIROS-N, SPACE ENVIRONMENT MONITOR (78-096A-04).....	87
GRUN, E. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY	
*GALILEO ORBITER, DUST (JOPO -09).....	115
*ISPM/ESA, COSMIC DUST (ISPESA -07).....	124
GUDMANSSEN, P. - TECH U OF DENMARK, LYNGBY, DENMARK	
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMRR) (78-092A-08).....	62
GUEST, J.E. - U OF LONDON, LONDON, ENGLAND	
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
GUEST INVESTIGATORS SEE EXPR. DESCRIPT.	
*IUE, LOW-/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE (78-012A-01).....	54
GUILLAUMON, J.C. - CNES/CST, TOULOUSE CEDEX, FRANCE	
SPACE SHUTTLE LDEF-A, THERMAL COATINGS AND STRUCTURAL MATERIAL (SSLDEF -34).....	143
GULKIS, S. - NASA-JPL, PASADENA, CA	
COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01).....	102
COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02).....	102
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	103
GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
VOIR, MICROWAVE ATMOSPHERIC (VOIR -05).....	170
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
GUNN, J.E. - CALIF INST OF TECH, PASADENA, CA	
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	158
GUNTON, R.G. - LOCKHEED PALO ALTO, PALO ALTO, CA	
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	168
GURNETT, D.A. - U OF IOWA, IOWA CITY, IA	
DYNAMICS EXPLORER 1, PLASMA WAVES (81-070A-02).....	19
*GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -07).....	115
*HELIOS-A, SOLAR WIND PLASMA WAVE (74-097A-04).....	37
*HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	37
*HELIOS-A, 26.5-KHZ TO 3-MHZ RADIO WAVE (74-097A-06).....	37
*IMP-J, ELECTROSTATIC WAVES AND RADIO NOISE (73-070A-12).....	41
*ISEE 1, PLASMA WAVES (77-102A-07).....	44
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	44
*ISEE 2, PLASMA WAVES (77-102B-05).....	46
ISEE 3, PLASMA WAVES (78-079A-07).....	48
OSS-1, PLASMA DIAGNOSTIC PACKAGE SHUTTLE-A-01).....	134
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPACELAB2-03).....	154
VOYAGER 1, PLASMA WAVE (.01-56 KHZ) (77-084A-13).....	93
VOYAGER 2, PLASMA WAVE (.01-56 KHZ) (77-076A-13).....	95
GUTTRIDGE, P. - MULLARD SPACE SCI LAB, LONDON, ENGLAND	
UOSAT, CHARGED PARTICLE (UOSAT -03).....	169
GUY, M. - CNES, TOULOUSE, FRANCE	
OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
HADDOCK, F.T. - U OF MICHIGAN, ANN ARBOR, MI	
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-076A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
HADLEY, H. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
HAERENDEL, G. - MPI-EXTRATERRE PHYS, GARCHING, FED REP OF GERMANY	
CCE, PLASMA COMPOSITION (CCE -01).....	102
*IRM, LI AND BA RELEASE MODULE (IRM -01).....	123
ISEE 1, ION COMPOSITION (77-102A-12).....	45
HAGGARD, K.V. - NASA-LARC, HAMPTON, VA	
UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGISTICS (UARS-1 -22).....	161
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGISTICS (UARS-2 -22).....	165
HALL, D.F. - AEROSPACE CORP, EL SEGUNDO, CA	
*STP P78-2, QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS (79-007A-03).....	84

INVESTIGATORS AND EXPERIMENTS

PAGE

*STP P7B-2, THERMAL CONTROL SAMPLE MONITOR (79-007A-04).....	85
HALL, L.A. - USAF GEOPHYS LAB, BEDFORD, MA AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
HAMEEN-ANTTILA, J. - U OF ARIZONA, TUCSON, AZ PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
HANELIN, M. - CNRS, ORLEANS, FRANCE SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-20).....	146
HANEL, R.A. - NASA-GSFC, GREENBELT, MD VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
HANSEN, J.E. - NASA-GISS, NEW YORK, NY GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPD -00).....	115
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	76
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	95
HANSEN, J.S. - U OF TORONTO, DOWNSVIEW, ONTARIO, CANADA SPACE SHUTTLE LDEF-A, PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT (SSLDEF-24).....	145
HANSON, W.B. - U OF TEXAS, DALLAS, RICHARDSON, TX AE-E, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	13
DYNAMICS EXPLORER 1, RETARDING ION MASS SPECTROMETER (81-070A-04).....	18
DYNAMICS EXPLORER 2, ION DRIFT METER (81-070B-06).....	21
DYNAMICS EXPLORER 2, RETARDING POTENTIAL ANALYZER (81-070B-07).....	21
SAN MARCO-07L, ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER) IVI (SM-01 -03).....	137
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
VOIR, VENUS IONOSPHERE DYNAMICS (VOIR -08).....	170
HANST, P.L. - ENVIRON PROTECT AGENCY, RESEARCH TRIANGLE PARK, NC UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	163
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	168
HARDY, D.A. - USAF GEOPHYS LAB, BEDFORD, MA *STP P7B-2, RAPID SCAN PARTICLE DETECTOR (79-007A-12).....	85
HARMS, R.J. - U OF CALIF, SAN DIEGO, LA JOLLA, CA *ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	158
HARRIS, R.D. - UTAH STATE U, LOGAN, UT SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
HART, J.E. - U OF COLORADO, BOULDER, CO *SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-08).....	148
*SPACELAB 3, GEOPHYSICAL FLUID FLOW CELL (GFFC) (SPALAB3-10).....	156
HARTLE, R.E. - NASA-GSFC, GREENBELT, MD GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	118
PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11).....	76
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
HARTMAN, R.C. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
HARTMANN, D.L. - U OF WASHINGTON, SEATTLE, WA UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	161
UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	166
HARTZ, T.R. - COMMUN RESEARCH CENTRL, OTTAWA, ONTARIO, CANADA *ISIS 1, COSMIC RADIO NOISE (69-009A-10).....	50
*ISIS 2, COSMIC RADIO NOISE (71-024A-10).....	52
HARVEY, C.C. - PARIS OBSERVATORY, MEUDON, FRANCE *ISEE 1, PLASMA DENSITY (77-102A-08).....	44
*ISEE 2, RADIO PROPAGATION (77-102B-06).....	46
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
HARVEY, J.W. - KITZ PEAK NATL OBS, TUCSON, AZ SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
HASHIMOTO, K. - KYOTO U, KYOTO, JAPAN JIKIKEN, VLF DOPPLER PROPAGATION (DPL) (78-007A-03).....	55
HAUSER, M.G. - NASA-GSFC, GREENBELT, MD COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01).....	102
COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02).....	102
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	103
HAUSLER, B. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY IRM, LI AND BA RELEASE MODULE (IRM -F1).....	123
HAYS, P.D. - U OF MICHIGAN, ANN ARBOR, MI AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11).....	13
DYNAMICS EXPLORER 2, FABRY-PEROT INTERFEROMETER (81-070B-05).....	21
UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HROI) (UARS-1 -02).....	161
UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HROI) (UARS-2 -02).....	166

INVESTIGATORS AND EXPERIMENTS

PAGE

HEAD, J.R. - NASA-GSFC, GREENBELT, MD GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
HEAP, S.R. - NASA-GSFC, GREENBELT, MD ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
HEATH, D.F. - NASA-GSFC, GREENBELT, MD *AE-E, BACKSCATTER UV SPECTROMETER (BUV) (75-107A-16).....	14
*NIMBUS 4, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (70-025A-05).....	59
*NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	62
HECKMAN, M.H. - LAWRENCE BERKELEY LAB, BERKELEY, CA *ISEE 3, HIGH-ENERGY COSMIC RAY (76-079A-05).....	47
HEDGECOCK, P.C. - IMPERIAL COLLEGE, LONDON, ENGLAND ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	45
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	46
*ISPM/ESA, MAGNETIC FIELD (ISPESA -08).....	124
HEDIN, A.E. - NASA-GSFC, GREENBELT, MD *AE-E, NEUTRAL ATMOSPHERE COMPOSITION (NACE) (75-107A-08).....	14
DYNAMICS EXPLORER 2, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (81-070B-03).....	21
DYNAMICS EXPLORER 2, WIND AND TEMPERATURE SPECTROMETER (81-070B-04).....	22
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	162
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	167
HEELIS, R.A. - U OF TEXAS, DALLAS, RICHARDSON, TX *DYNAMICS EXPLORER 2, ION DRIFT METER (81-070B-06).....	21
DYNAMICS EXPLORER 2, RETARDING POTENTIAL ANALYZER (81-070B-07).....	21
*UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
*UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
*VOIR, VENUS IONOSPHERE DYNAMICS (VOIR -08).....	170
HEETDERKS, M. - U OF CALIF, BERKELEY, BERKELEY, CA EUVE, EXTREME ULTRAVIOLET FULL-SKY SURVEY (EUVE -01).....	111
HELLIWELL, R.A. - STANFORD U, PALO ALTO, CA *DYNAMICS EXPLORER 2, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (81-070A-08).....	19
*ISEE 1, VLF WAVE PROPAGATION (77-102A-13).....	44
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
HEMENWAY, P.D. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, ASTROMETRY SCIENCE (LST -09).....	158
HEMPE, M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	38
HENRY, D. - CNRS, ORLEANS, FRANCE SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
HENRY, R.M. - U OF WASHINGTON, SEATTLE, WA VIRING 1 LANDER, METEOROLOGY (75-075C-07).....	90
HEPPNER, J.P. - NASA-GSFC, GREENBELT, MD DYNAMICS EXPLORER 2, ELECTRIC FIELD INVESTIGATIONS (81-070B-02).....	22
IMP-J, ELECTROSTATIC FIELDS (73-078A-11).....	40
*ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	44
SAN MARCO-D/L, 3-AXIS ELECTRIC FIELD INSTRUMENT (EFI) (SM-DL -05).....	137
HERMAN, B.M. - U OF ARIZONA, TUCSON, AZ NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-11 (SAM-11) (78-098A-06).....	64
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	76
HERMAN, J.R. - NASA-GSFC, GREENBELT, MD PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
HERMSEN, W. - U OF LEIDEN, LEIDEN, NETHERLANDS GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
HERNANDEZ, G. - NOAA-ERL, BOULDER, CO UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02).....	161
UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	166
HERRING, J.R.H. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	155
HERSE, M. - CNRS-SA, VERNIERES-LE-BUISSON, FRANCE *SPACELAB 1, WAVES IN THE OH EMISSIVE LAYER (SPALAB1-19).....	148
HESKETH, W.D. - NASA-LARC, HAMPTON, VA OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
HESS, S.L. - FLORIDA STATE U, TALLAHASSEE, FL *VIRING 1 LANDER, METEOROLOGY (75-075C-07).....	90
HICKEY, J.R. - EPPLEY LAB, INC, NEWPORT, RI NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	61
NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
*SPACE SHUTTLE LDEF-A, PASSIVE EXPOSURE OF EARTH RADIATION BUDGET EXPERIMENT COMPONENTS (SSLEDEF -27).....	141
HIGBIE, P.R. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM *1976-059A, ENERGETIC PARTICLE DETECTOR (76-059A-01).....	11
*1977-007A, ENERGETIC PARTICLE DETECTOR (77-007A-01).....	11
*1979-053A, ENERGETIC PARTICLE DETECTOR (79-053A-01).....	11
*1981-025A, ENERGETIC PARTICLE DETECTOR (81-025A-01).....	12
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75

HILDNER, E.G. - HIGH ALTITUDE OBS, BOULDER, CO SMN, CORONAGRAPH/POLARIMETER (80-014A-01).....	80
HILSENATH, E. - NASA-GSFC, GREENBELT, MD UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	162
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	167
HINTEREGGER, M.E. - USAF GEOPHYS LAB, BEDFORD, MA *AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
HIRAO, K. - U OF TOKYO, TOKYO, JAPAN EXOS-C, PRECIPITATING PARTICLE ENERGY ANALYZER (EXOS-C -04).....	112
EXOS-C, PLASMA PROBES (EXOS-C -07).....	112
*HINOTORI, PLASMA PROBES (81-017A-06).....	39
HIRASHIMA, Y. - RIKKYO U, TOKYO, JAPAN HINOTORI, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.2-9.0 MEV RANGE (81-017A-04).....	39
HOEGY, W.R. - NASA-GSFC, GREENBELT, MD DYNAMICS EXPLORER 1, LANGMUIR PROBE (81-0700-09).....	20
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
HOFFMAN, M.-J. - U OF BONN, BONN, FED REP OF GERMANY GALILEO PROBE, HELIUM ABUNDANCE INTERFEROMETER (JOP -01).....	118
HOFFMAN, J.H. - U OF TEXAS, DALLAS, RICHARDSON, TX DYNAMICS EXPLORER 1, RETARDING ION MASS SPECTROMETER (81-070A-04).....	18
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
HOFFMAN, R.A. - NASA-GSFC, GREENBELT, MD DYNAMICS EXPLORER 1, HIGH ALTITUDE PLASMA INSTRUMENT (81-070A-05).....	18
DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INSTRUMENT (81-0700-08).....	23
*DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (81-0700-13).....	22
HOFFMANN, W.F. - U OF ARIZONA, TUCSON, AZ SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
HOFSTADTER, R. - STANFORD U, PALO ALTO, CA *GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	110
HOLMGREN, L.A. - KIRUNA GEOPHYS INST, KIRUNA, SWEDEN ESA-GEOS 2, LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-04).....	24
HOLT, O. - AURORAL OBS, TROMSO, NORWAY ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	51
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	53
HOLT, S.S. - NASA-GSFC, GREENBELT, MD HEAD 2, MONITOR PROPORTIONAL COUNTER (MPC) (78-103A-01).....	35
HEAD 2, HIGH-RESOLUTION IMAGER (HRI) (78-103A-02).....	35
HEAD 2, FOCAL PLANE CRYSTAL SPECTROMETER (FPCS) (78-103A-03).....	35
HEAD 2, IMAGING PROPORTIONAL COUNTER (IPC) (78-103A-04).....	35
HOLTON, E. - NASA-ARC, MOFFETT FIELD, CA SPACELAB 2, VITAMIN D METABOLITES AND BONE DEMINERALIZATION (SPALAB2-01).....	154
HOLTON, J.R. - U OF WASHINGTON, SEATTLE, WA UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
*UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	161
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
*UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	166
HOMICK, J.L. - NASA-JSC, HOUSTON, TX SPACELAB 1, VESTIBULO-SPINAL REFLEX MECHANISMS (SPALAB1-16).....	149
HONECK, S. - U OF FRANKFURT, FRANKFURT, FED REP OF GERMANY *SPACELAB 1, MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT (SPALAB1-34).....	149
HONES, JR., E.W. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	47
HORD, C.W. - U OF COLORADO, BOULDER, CO *GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	115
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	77
SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	162
UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	167
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	95
HORZ, F. - NASA-JSC, HOUSTON, TX *SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIODS (SSLDEF -51).....	141
HOUGHTON, J.Y. - OXFORD U, OXFORD, ENGLAND *NIMBUS 5, SELECTIVE CHOPPER RADIOMETER (SCR) (72-097A-02).....	60
*NIMBUS 6, PRESSURE MODULATED RADIOMETER (PMR) (75-052A-09).....	61
*NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	62
*UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
*UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
HOUSE, F.B. - DREXEL U, PHILADELPHIA, PA NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63

HOUSE, L.L. - HIGH ALTITUDE OBS, BOULDER, CO *SMN, CORONAGRAPH/POLARIMETER (88-014A-01).....	80
HOUSLEY, R.W. - ROCKWELL INTL CORP, THOUSAND OAKS, CA SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEOROIDS (SSLDEF -01).....	141
HOVESTADT, D.K. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY CCE, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCE -03).....	101
IMP-1, SOLID-STATE DETECTORS (73-078A-03).....	41
*ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	44
ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	43
*ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48
ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	49
HOVIS, W.A. - NOAA-NESS, SUITLAND, MD *NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
HOWARD, M.T. - STANFORD U, PALO ALTO, CA PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	69
HOWARD, K.A. - US GEOLOGICAL SURVEY, MENLO PARK, CA VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
HUANG, F.T. - COMPUTER SCIENCES CORP, SILVER SPRING, MD UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	162
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	167
HUANG, N.E. - NASA-WFC, WOLLOPS ISLAND, VA OSTA-1, OCEAN COLOR (OCE) (OSTA-1 -05).....	135
HUCK, F.O. - NASA-LARC, HAMPTON, VA VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	90
HUGHES, E.B. - STANFORD U, PALO ALTO, CA GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	110
MULTQVIST, B.K.G. - KIRUNA GEOPHYS INST, KIRUNA, SWEDEN ESA-GEOS 2, LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-04).....	24
HUMES, D.M. - NASA-LARC, HAMPTON, VA PIONEER 10, METEOROID DETECTORS (72-012A-04).....	71
PIONEER 11, METEOROID DETECTORS (73-019A-04).....	74
*SPACE SHUTTLE LDEF-A, SPACE DEBRIS IMPACT STUDY (SSLDEF -36).....	141
HUMMER, R.F. - SANTA BARBARA RES CTR, GOLETA, CA PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
HUNDHAUSEN, A.J. - NATL CTR FOR ATMOS RES, BOULDER, CO VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
HUNTERMAN, R. - READING U, READING, ENGLAND SPACE SHUTTLE LDEF-A, HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS (SSLDEF -23).....	144
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
HUNT, G.E. - U COLLEGE LONDON, LONDON, ENGLAND VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
HUNTER, D.M. - U OF ARIZONA, TUCSON, AZ *GALILEO ORBITER, STRUCTURE AND AERONOMY OF THE ATMOSPHERES OF JUPITER AND ITS SATELLITES (JOPO -14).....	115
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	118
HURLEY, K.C. - CESR, TOULOUSE, FRANCE *ISPM/ESA, SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST (ISPESA -01).....	124
HUTCHINGS, J.B. - DOMINION ASTROPHYS OBS, VICTORIA, CANADA ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
HWANG, P.H. - NASA-GSFC, GREENBELT, MD *NIMBUS 7, TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR) (78-096A-10).....	63
HYNDS, R.J. - IMPERIAL COLLEGE, LONDON, ENGLAND *ISEE 3, ENERGETIC PROTONS (78-079A-08).....	46
IMAI, T. - INST PHYS & CHEM RES, TOKYO, JAPAN MINOTORI, ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR (81-017A-05).....	40
IMHOFF, W.L. - LOCKNEED PALO ALTO, PALO ALTO, CA NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	62
*STP P7E-1, GAMMA RAY SPECTROMETER (79-017A-01).....	63
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	166
INGERSOLL, A.P. - CALIF INST OF TECH, PASADENA, CA NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
*PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	73
INOUE, M. - U OF TOKYO, TOKYO, JAPAN ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
MARUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MINOTORI, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-20 KEV RANGE (81-017A-03).....	39
INTRILIGATOR, D.S. - U OF SOUTHERN CALIF, LOS ANGELES, CA PIONEER 10, PLASMA (72-012A-13).....	72

INVESTIGATORS AND EXPERIMENTS

PAGE

PIONEER 11, PLASMA (73-019A-13).....	76
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	77
ISRAEL, M.M. - WASHINGTON U, SAINT LOUIS, MO	
*HEAD 3, HEAVY NUCLEI (79-002A-03).....	36
ITOH, T. - U OF TOKYO, TOKYO, JAPAN	
*EOS-C, INFRARED SOLAR SPECTROMETER (75-05-C-03).....	112
*EOS-C, PRECIPITATING PARTICLE ENERGY ANALYZER (EOS-C-04).....	112
IVES, J. - U COLLEGE LONDON, LONDON, ENGLAND	
*SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	149
IWAGAMI, N. - U OF TOKYO, TOKYO, JAPAN	
*EOS-C, ULTRAVIOLET SPECTROMETER (EOS-C-02).....	112
IWAMOTO, I. - RADIO RESEARCH LAB, TOKYO, JAPAN	
*ISS-B, ION MASS SPECTROMETER (78-018A-04).....	93
JACKSON, E.B. - NASA-WFC, WOLLOPS ISLAND, VA	
*GEOS 3, C-BAND SYSTEM (75-027A-03).....	26
JACKSON, J.E. - NASA-GSFC, GREENBELT, MD	
*ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	91
*ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	93
JACOBOWITZ, H. - NOAA-NESS, SUITLAND, MD	
*MINIBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	61
*MINIBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
JACOBSON, A.S. - NASA-JPL, PASADENA, CA	
*HEAD 3, GAMMA-RAY LINE SPECTROMETER (79-062A-01).....	36
*SMR, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
JAMES, T.C. - LOCKHEED PALO ALTO, PALO ALTO, CA	
*UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1-05).....	162
*UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2-05).....	167
JANSEN, H. - NASA-JPL, PASADENA, CA	
*VOIR, MICROWAVE ATMOSPHERIC (VOIR -05).....	170
JEFFERYS, M.M. - U OF TEXAS, AUSTIN, AUSTIN, TX	
*ST, ASTROMETRY SCIENCE (LST -09).....	158
JENNISON, R.C. - U OF KENT, CANTERBURY, KENT, ENGLAND	
*SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	142
JIRICEK, F. - CZECH ACAD OF SCI, PRAGUE, CZECHOSLOVAKIA	
*MAGION, ELF AND VLF RECEIVERS (78-099C-01).....	57
*MAGION, ENERGETIC PARTICLE DETECTORS (78-099C-02).....	57
JNA STAFF, JAPANESE METEOROL AGCY, TOKYO, JAPAN	
*GMS, VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR) (77-065A-01).....	27
*GMS, WEATHER COMMUNICATIONS FACILITY (77-065A-03).....	28
*GMS-2, VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR) (81-076A-01).....	28
*GMS-2, WEATHER COMMUNICATIONS FACILITY (81-076A-03).....	28
JOHNSON, P.C. - BAYLOR U, WACO, TX	
*SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
JOHNSON, R.G. - LOCKHEED PALO ALTO, PALO ALTO, CA	
*CEE, PLASMA COMPOSITION (CEE -01).....	102
*DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (81-078A-06).....	19
*ISEE 1, ION COMPOSITION (77-102A-12).....	45
*STP #78-2, ENERGETIC ION SPECTROMETER (79-007A-13).....	85
JOHNSON, T.V. - NASA-JPL, PASADENA, CA	
*GALILEO ORBITER, NEAR INFRARED SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
*VOYAGER 1, IMAGING (77-084A-01).....	93
*VOYAGER 2, IMAGING (77-076A-01).....	95
JOHNSON, W.N. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
*GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	119
*SMR, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
JOHNSTON, A.R. - NASA-JPL, PASADENA, CA	
*SPACE SHUTTLE LDEF-A, FIBER OPTICS EXPERIMENT (SSLDEF -03).....	142
JOHNSTONE, A.D. - MULLARD SPACE SCI LAB, HOLMBURY, ST. MARY, ENGLAND	
*GIOTTO, FAST IMPLANTED ION SENSOR (JPA) (GIOTTO -05).....	120
JOKEPII, J.R. - U OF ARIZONA, TUCSON, AZ	
*VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	93
*VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	96
JONES, B.R. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND	
*SMR, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	79
JONES, D. - BRITISH ANTARCTIC SURV, CAMBRIDGE, ENGLAND	
*ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	25
*GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	114
*ISEE 1, PLASMA DENSITY (77-102A-08).....	44
*ISEE 2, RADIO PROPAGATION (77-102B-06).....	46
JONES, D.E. - BRIGHAM YOUNG U, PROVO, UT	
*ISEE 3, MAGNETIC FIELDS (78-079A-02).....	48
*PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	74

JONES, G.M. - MCGILL U, MONTREAL, QUEBEC, CANADA SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	151
JORDAN, C. - OXFORD U, OXFORD, ENGLAND SMM, SOFT X-RAY POLYCHROMATOR (XRP) (88-014A-04).....	79
JOSELYN, J.C. - NOAA-ERL, BOULDER, CO GOES 1, MAGNETIC FIELD MONITOR (75-100A-04).....	29
GOES 2, MAGNETIC FIELD MONITOR (77-040A-04).....	30
GOES 3, MAGNETIC FIELD MONITOR (78-062A-04).....	31
GOES 4, MAGNETIC FIELD MONITOR (88-074A-04).....	32
GOES 5, MAGNETIC FIELD MONITOR (81-049A-04).....	34
SMS 2, MAGNETIC FIELD MONITOR (75-011A-03).....	62
JUDGE, D.L. - U OF SOUTHERN CALIF, LOS ANGELES, CA PIONEER 10, ULTRAVIOLET PHOTOMETRY (72-012A-06).....	71
PIONEER 11, ULTRAVIOLET PHOTOMETRY (73-019A-06).....	73
JULIAN, P. - NATL CTR FOR ATMOS RES, BOULDER, CO NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	61
JURA, M.A. - U OF CALIF, LA, LOS ANGELES, CA ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
KAISER, M.L. - NASA-GSFC, GREENBELT, MD VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-004A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
KANADA, T. - NAGOTA U, NAGOTA, JAPAN JIKIKEN, STIMULATED PLASMA WAVE (SPW) (78-087A-01).....	55
KAMPERRAN, T.M. - ASTRONOMICAL INST, UTRECHT, NETHERLANDS ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	158
KAMBACH, G. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	114
KANE, S.R. - U OF CALIF, BERKELEY, BERKELEY, CA ISEE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	47
ISEE 3, X- AND GAMMA-RAY BURSTS (78-079A-14).....	47
KASSEL, JR., P. - NASA-LARC, HAMPTON, VA SPACE SHUTTLE LOEF-A, INTERPLANETARY DUST (SSLD8F -52).....	144
KAULA, M.M. - U OF CALIF, LA, LOS ANGELES, CA PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	77
KAWASHIMA, N. - U OF TOKYO, TOKYO, JAPAN JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-087A-06).....	55
JIKIKEN, CONTROLLED ELECTRON BEAM EMISSIONS (CBE) (78-087A-07).....	55
KAYA, N. - KOBE U, KOBE, JAPAN EXOS-C, PRECIPITATING PARTICLE ENERGY ANALYZER (EXOS-C -04).....	112
KEATH, E.P. - APPLIED PHYSICS LAB, LAUREL, MD VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
KEATING, G.W. - NASA-LARC, HAMPTON, VA PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	75
KELLER, H.U. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY GIOTTO, HALLEY NUCLEUS IMAGING (HNC) (GIOTTO -01).....	120
KELLEY, M.C. - CORNELL U, ITHACA, NY ISEE 1, QUASI-STATIC ELECTRIC FIELDS (77-102A-06).....	45
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
KELLOGG, P.J. - U OF MINNESOTA, MINNEAPOLIS, MN HELIOS-A, SOLAR WIND PLASMA WAVE (74-097A-04).....	37
HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	37
HELIOS-A, 26.5-KHZ TO 3-MHZ RADIO WAVE (74-097A-06).....	37
KELLOGG, M.W. - NATL CTR FOR ATMOS RES, BOULDER, CO NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	61
KELLY, K.K. - U OF COLORADO, BOULDER, CO GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JUPO -02).....	115
KENDALL, SR., J. - CALIF INST OF TECH, PASADENA, CA SPACELAB 1, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	151
KENKNIGHT, C.E. - U OF ARIZONA, TUCSON, AZ PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
KENNEL, C.F. - U OF CALIF, LA, LOS ANGELES, CA DYNAMICS EXPLORER 1, AURORAL PHYSICS (81-070A-07).....	14
GALILEO ORBITER, MAGNETOMETER (JUPO -03).....	115
GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JUPO -07).....	115
ISEE 1, HOT PLASMA (77-102A-03).....	43
ISEE 2, HOT PLASMA (77-102B-03).....	46
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	77
KEPPLER, E. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	25
HELIOS-A, ENERGETIC ELECTRON AND PROTON DETECTOR (74-097A-10).....	36
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	47

KIEFFER, H.M. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JUPO -01).....	114
*VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTH) (78-079A-02).....	91
KIM, H.M. - NASA-GSFC, GREENBELT, MD OSTA-1, OCEAN COLOR (OCE) (OSTA-1 -09).....	139
KIMURA, I. - KYOTO U, KYOTO, JAPAN JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	99
*JIKIKEN, VLF DOPPLER PROPAGATION (DPL) (78-087A-03).....	90
KIMZEY, S.L. - NASA-JSC, HOUSTON, TX *SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
KINARD, W.M. - NASA-LARC, HAMPTON, VA *PIONEER 10, METEOROID DETECTORS (72-012A-04).....	71
*PIONEER 11, METEOROID DETECTORS (73-019A-04).....	74
KING, H.M. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (SSLDEF -04).....	145
KING, I.N. - U OF CALIF, BERKELEY, BERKELEY, CA ST, FAINT-OBJECT CAMERA (FOC) (LST -00).....	190
KINSER, D.L. - VANDERBILT U, NASHVILLE, TN SPACE SHUTTLE LDEF-A, EFFECTS OF SOLAR RADIATION ON GLASSES (SSLDEF -04).....	143
KINZER, R.L. - US NAVAL RESEARCH LAB, WASHINGTON, DC GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	119
SM, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
KIRK, D.B. - NASA-ARC, HOFFETT FIELD, CA GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	110
KIRSCH, U OF BERLIN, BERLIN, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	140
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.M., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	140
KISSEL, J. - MPI-NUCLEAR PHYS, D. DELBERG, FED REP OF GERMANY GALILEO ORBITER, DUST (JOP -09).....	115
*GIOTTO, DUST IMPACT MASS SPECTROMETER (PIA) (GIOTTO -04).....	120
KIVELSON, M.G. - U OF CALIF, LA, LOS ANGELES, CA *GALILEO ORBITER, MAGNETOMETER (JUPO -03).....	115
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	45
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	46
KLARMANN, J. - WASHINGTON U, SAINT LOUIS, MO HEAD 3, HEAVY NUCLEI (79-022A-03).....	36
KLESZADEL, R.W. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM ISEE 3, X- AND GAMMA-RAY BURSTS (78-079A-14).....	47
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75
KLEINMANN, D.E. - SAO, CAMBRIDGE, MA SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
KLIORE, A.J. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JUPO -11).....	113
*PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	71
*PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	74
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	75
KLUMPAR, D.M. - U OF TEXAS, DALLAS, RICHARDSON, TX DYNAMICS EXPLORER 1, HIGH ALTITUDE PLASMA INSTRUMENT (81-070A-05).....	18
DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INSTRUMENT (81-070B-08).....	23
DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (81-070B-13).....	22
KNIFFEN, D.A. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
KNOLL, R. - PARIS OBSERVATORY, MEUDON, FRANCE ISEE 3, RADIO MAPPING (78-079A-10).....	49
KNOTHE, M. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-DL -02).....	137
KNOTT, K. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	25
GALILEO ORBITER, ELECTRON Emitter (JUPO -05).....	114
KNUDSEN, M.C. - LOCKHEED PALO ALTO, PALO ALTO, CA *PIONEER VENUS 1, RETARDING POTENTIAL ANALYZER (78-051A-07).....	76
KOCH, L. - CENS, SACLAY, FRANCE *HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
KOCH, R. - U OF BERLIN, BERLIN, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	140
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.M., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	140
KOCKARTS, G. - IASM, BRUSSELS, BELGIUM SPACELAB 1, INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA (SPALAB1-22).....	146
KOMNO, Y. - METEOROL RES INST, TOKYO, JAPAN *GMS, SPACE ENVIRONMENT MONITOR (SEM) (77-045A-02).....	28
*GMS-2, SPACE ENVIRONMENT MONITOR (SEM) (81-076A-02).....	28

KONDO, I. - U OF TOKYO, TOKYO, JAPAN HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MINOTORI, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.2-9.0 MEV RANGE (01-017A-04).....	39
KONDO, Y. - NAGOYA U, NAGOYA, JAPAN EXOS-C, SOLAR IMAGE-RADIOMETER (EXOS-C-05).....	112
KOONS, M.C. - AEROSPACE CORP, EL SEGUNDO, CA STP P78-2, CHARGING ELECTRICAL EFFECTS ANALYZER (79-007A-02).....	89
KOPP, R. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM SMN, CORONAGRAPH/POLARIMETER (00-014A-01).....	60
KORTH, A. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (70-071A-01).....	25
KOTAKI, M. - RADIO RESEARCH LAB, TOKYO, JAPAN ISS-B, RADIO NOISE NEAR 2.5, 5, 10, AND 20 MHz (70-018A-02).....	93
KOTAKA, K. - U OF TOKYO, TOKYO, JAPAN ASTRO-B, G-8 SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MINOTORI, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-20 KEV RANGE (01-017A-03).....	39
KRANKOWSKY, D. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY GIOTTO, NEUTRAL MASS SPECTROMETER (NMS) (GIOTTO-02).....	120
KREPLIN, R.W. - US NAVAL RESEARCH LAB, WASHINGTON, DC STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	83
KRIDER, E.P. - U OF ARIZONA, TUCSON, AZ GALILEO PROBE, LIGHTNING (JOP-06).....	117
KRINIGIS, S.M. - APPLIED PHYSICS LAB, LAUREL, MD CCE, MEDIUM ENERGY PARTICLE ANALYZER (MEPA) (CCE-02).....	102
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO-06).....	117
IMP-J, CHARGED PARTICLE MEASUREMENTS EXPERIMENT (73-078A-00).....	41
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-004A-07).....	92
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
KRISTIAN, J. - CALIF INST OF TECH, PASADENA, CA ST, WIDE-FIELD CAMERA (WFC) (LST-07).....	154
KROES, R.L. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 3, FLUID EXPERIMENT SYSTEMS (FES) (SPALAB3-01).....	156
KRUEGER, A.J. - NASA-GSFC, GREENBELT, MD NIMBUS 4, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (70-025A-05).....	54
NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (70-050A-09).....	62
KURO, M. - U OF TOKYO, TOKYO, JAPAN EXOS-C, PRECIPITATING PARTICLE ENERGY ANALYZER (EXOS-C-04).....	112
JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (70-007A-06).....	95
KUEHNE, F. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LOEF-A, EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS (SSLEDF-20).....	141
KUMAR, S. - U OF SOUTHERN CALIF, LOS ANGELES, CA VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-004A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
KUMER, J.D. - LOCKHEED PALO ALTO, PALO ALTO, CA UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1-05).....	162
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2-05).....	167
KUMDE, V.G. - NASA-GSFC, GREENBELT, MD UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER (UARS-1-12).....	160
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER (UARS-2-12).....	165
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-004A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
KUNDT, W. - U OF HAMBURG, HAMBURG, FED REP OF GERMANY HELIOS-A, CELESTIAL MECHANICS (74-097A-14).....	38
KUNIEDA, M. - NAGOYA U, NAGOYA, JAPAN HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
KUNOW, M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	30
KURFESS, J.D. - US NAVAL RESEARCH LAB, WASHINGTON, DC GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO-02).....	119
SMN, GAMMA-RAY SPECTROMETER (GRE) (00-014A-07).....	74
KURT, V.G. - IKI, MOSCOW, USSR VENERA 11, UV GRATING MONOCHROMATOR (70-044A-03).....	86
VENERA 12, UV GRATING MONOCHROMATOR (70-006A-03).....	89
KURZBA, R.J. - GEORGE WASHINGTON U, WASHINGTON, DC UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-1-22).....	161
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-2-22).....	165
LEMEUREUX, J. - U OF CHICAGO, CHICAGO, IL SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-04).....	153
LABS, D. - LANDESTERNHUETE, HEIDELBERG, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	150

INVESTIGATORS AND EXPERIMENTS

PAGE

LACIS, A.A. - NASA-GISS, NEW YORK, NY	
*GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPD -88).....	119
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-091A-86).....	76
LAL, D. - PHYSICAL RESEARCH LAB, AHMEDABAD, INDIA	
*SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-18).....	188
LAL, R.D. - ALAURMA A-M U, NORMAL, AL	
*SPACELAB 3, FLUID EXPERIMENT SYSTEMS (FES) (SPALAB3-01).....	186
LAMPSON, J.E. - U OF CHICAGO, CHICAGO, IL	
PIONEER 6, COSMIC-RAY TELESCOPE (65-183A-83).....	67
SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	183
LANDACKER, P.D. - AEROSPACE CORP, EL SEGUNDO, CA	
*STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-83).....	83
LANE, A.L. - NASA-JPL, PASADENA, CA	
*GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPD -82).....	119
*VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	98
LANGE, R.D. - U OF TENNESSEE, KNOXVILLE, TN	
SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
LANGE, R.A. - NASA-GSFC, GREENBELT, MD	
*HAGSAT, SCALAR MAGNETOMETER (79-094A-01).....	98
*HAGSAT, VECTOR MAGNETOMETER (79-094A-02).....	98
LANZUOTTI, L.J. - BELL TELEPHONE LAB, MURRAY HILL, NJ	
*GALILEO ORBITER, ENERGETIC PARTICLES (JOPD -86).....	117
*GALILEO PROBE, LIGHTNING (JOP -86).....	117
*ISPM/ESA, HELIOSPHERE (ISPM-83).....	124
*VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	92
*VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	95
LAPORTE, D.D. - SANTA BARBARA RES CTR, GOLETA, CA	
VIRING 1 ORBITER, MARS ATMOSPHERIC WATER DETECTION (MAWD) (75-079A-83).....	91
LANKIN, E.C. - VETERANS ADMIN HOSP, MARTINEZ, CA	
SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
LAPSON, J.C. - LOCKHEED PALO ALTO, PALO ALTO, CA	
*STP P88-1, TEAL RUBY (P88-1 -81).....	189
LAURENAT, J. - CNRS, SAINT-MAUR DES FOSSES, FRANCE	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-29).....	146
LAUHLIN, C.R. - NASA-GSFC, GREENBELT, MD	
*NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-092A-01).....	61
LAVOI, P.A. - ILC TECHNOLOGY INC, SUNNYVALE, CA	
*SPACE SHUTTLE LDEF-A, LARGE SPACE STRUCTURE LIGHTING EVALUATION (SSLDEF -87).....	142
LAZARUS, A.J. - MASS INST OF TECH, CAMBRIDGE, MA	
IMP-J, SOLAR PLASMA PARADAY CUP (75-078A-02).....	48
PIONEER 6, SOLAR WIND PLASMA PARADAY CUP (65-185A-82).....	67
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
LEADABRAND, R.L. - SRI INTERNATIONAL, MENLO PARK, CA	
PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-188A-83).....	69
LERLANC, Y. - PARIS OBSERVATORY, MEUDON, FRANCE	
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
LEDLEY, J.G. - NASA-GSFC, GREENBELT, MD	
DYNAMICS EXPLORER 1, MAGNETIC FIELD OBSERVATIONS (81-070A-01).....	29
DYNAMICS EXPLORER 2, MAGNETIC FIELD OBSERVATIONS (81-070B-01).....	23
*STP P75-2, MAGNETIC FIELD MONITOR (79-087A-86).....	85
LEFEBVRE, D.M. - CNRS, TOULOUSE, FRANCE	
*VOIR, GRAVITY, ATMOSPHERIC, AND SOLID TIDES (GASTE) (VOIR -82).....	170
LEINERT, C. - MPI-ASTRONOMIE, HEIDELBERG, FED REP OF GERMANY	
*HELIOS-A, ZODIACAL LIGHT PHOTOMETER (76-097A-11).....	38
LEVY, C.R. - U OF WASHINGTON, SEATTLE, WA	
JARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (74-08-1 -17).....	161
JARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (JARS-2 -17).....	166
VIRING 1 LANDER, METEOROLOGY (75-075C-07).....	98
LEPINE, D. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND	
UOSAT, CHARGED PARTICLE (UOSAT -83).....	169
LEPPING, R.P. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	93
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	95
LEVASSEUR-REGUARD, A.C. - CNRS, VERNIERES-LE-BUISSON, FRANCE	
*GIOTTO, OPTICAL PROBE (OPE) (GIOTTO -89).....	120
LEVINTHAL, E.C. - STANFORD U, PALO ALTO, CA	
VIRING 1 LANDER, LANDER IMAGING (75-075C-06).....	98
LIVY, G.S. - NASA-JPL, PASADENA, CA	
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93

VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
LEWIS, J.S. - MASS INST OF TECH, CAMBRIDGE, MA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (MINS) INVESTIGATION AND MAPPER (J0PO -01).....	114
LICKIN, O.B. - IKI, MOSCOW, USSR *PROGNOZ B, SOLAR X-RAY SPECTROMETER (80-103A-01).....	78
LIEBES, JR., S. - STANFORD U, PALO ALTO, CA VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	98
LIN, R.P. - U OF CALIF, BERKELEY, BERKELEY, CA ISEE 1, ELECTRONS AND PHOTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PHOTONS (77-102B-08).....	45
ISEE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	47
LIND, D.L. - NASA-JSC, HOUSTON, TX ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	48
*SPACE SHUTTLE LDEF-A, INTERSTELLAR GAS (SSLDEF -48).....	142
LIND, M.D. - ROCKWELL INTER SCI CTR, THOUSAND OAKS, CA *SPACE SHUTTLE LDEF-A, GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW GRAVITY (SSLDEF -17).....	142
LINDAL, G.F. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (J0PO -11).....	113
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	98
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
LINDBLAD, B.A. - LUND OBS, LUND, SWEDEN GALILEO ORBITER, DUST (J0PO -09).....	115
LINSKY, J.L. - U OF COLORADO, BOULDER, CO ST, HIGH-RESOLUTION SPECTROGRAPH (MRS) (L... -02).....	157
LINTON, R.C. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, ATOMIC OXYGEN STIMULATED OUTGASSING (SSLDEF -07).....	144
LIPPENCOTT, C.R. - U OF TEXAS, DALLAS, RICHARDSON, TX AE-E, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	13
DYNAMICS EXPLORER 2, ION DRIFT METER (81-070B-06).....	21
DYNAMICS EXPLORER 2, RETARDING POTENTIAL ANALYZER (81-070B-07).....	21
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
VOIR, VENUS IONOSPHERE DYNAMICS (VOIR -08).....	170
LIU, S.C. - NOAA, BOULDER, CO UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	168
LIVINGSTON, W.C. - KITT PEAK NATL OBS, TUCSON, AZ SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
LOCKWOOD, J.A. - U OF NEW HAMPSHIRE, DURHAM, NH GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
LOGACHEV, YU.I. - INST NUCLEAR PHYSICS, MOSCOW, USSR *VENERA 11, ELECTRON AND PROTON SPECTROMETER (78-084A-04).....	88
*VENERA 12, ELECTRON AND PROTON SPECTROMETER (78-086A-04).....	89
LOIDL, H. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	24
LONDON, J. - U OF COLORADO, BOULDER, CO SME, UV JZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
UARS-1, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-1 -04).....	163
*UARS-1, RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY (UARS-1 -19).....	162
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	162
UARS-2, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-2 -04).....	167
*UARS-2, RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY (UARS-2 -19).....	166
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	167
LONG, R.A. - SRI INTERNATIONAL, MENLO PARK, CA PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	69
LOVILL, J.E. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	160
UARS-2, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	164
LOW, F.J. - U OF ARIZONA, TUCSON, AZ SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
LUDWIG, C.B. - PHOTON RESEARCH INC, LA JOLLA, CA OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
LUND, N. - DANISH SPACE RES INST, LYNGBY, DENMARK HEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
LUST, R. - MPI-HEADQUARTERS, MUNICH, FED REP OF GERMANY PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75

LUTHER, F.M. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA	
UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	160
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	164
LYNDS, C.N. - KITT PEAK NATL OBS, TUCSON, AZ	
ST, WIDE-FIELD CAMERA (WFC) (LST -87).....	188
LYON, E.F. - MASS INST OF TECH, CAMBRIDGE, MA	
IMP-J, SOLAR PLASMA FARADAY CUP (75-076A-02).....	40
MACDONALD, M. - U OF ARKANSAS, FAYETTEVILLE, AR	
OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
MAKAY, C.D. - U OF CAMBRIDGE, CAMBRIDGE, ENGLAND	
ST, FAINT-OBJECT CAMERA (FOC) (LST -88).....	158
MACQUEEN, H.R. - HIGH ALTITUDE OBS, BOULDER, CO	
*ISPM/NASA, WHITE-LIGHT CORONAGRAPH/X-RAY XUV TELESCOPE (CXR) (ISPMASA-01).....	126
MAELUM, B.N. - NDRE, KJELLER, NORWAY	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
MAGGS, J.E. - U OF CALIF, LA, LOS ANGELES, CA	
DYNAMICS EXPLORER 1, AURORAL PHYSICS (01-070A-07).....	19
MAGUIRE, W.C. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
MAIER, A. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY	
HELIOS-A, FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS (74-097A-01).....	38
MAIER, E.J. - NASA-GSFC, GREENBELT, MD	
*ISIS 2, RETARDING POTENTIAL ANALYZER (71-024A-04).....	52
MAKINO, F. - NAGOYA U, NAGOYA, JAPAN	
ASTRO-B, X-RAY REFLECTING TELESCOPE (ASTRO-B-04).....	101
MAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MAKUCHO, DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES (79-014A-02).....	34
MAKINO, T. - RIKKYO U, TOKYO, JAPAN	
*EXOS-C, LIMP SCANNING IR RADIOMETER (EXOS-C -01).....	111
MAKISHIMA, K. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
MAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MALCOLM, W.E. - DYC INST OF ENVIRN MED, DOWNSVIEW, ONTARIO, CANADA	
SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	151
MALHERRE, A. - MATRA/SFON OPTICAL DIV, RUEIL CEDX, FRANCE	
*SPACE SHUTTLE LDEF-A, VACUUM DEPOSITED OPTICAL COATINGS (SSLDEF -41).....	142
MALINA, R. - U OF CALIF, BERKELEY, BERKELEY, CA	
*EUVE, EXTREME ULTRAVIOLET FULL-SKY SURVEY (EUVE -01).....	111
SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	146
MANDEVILLE, J.C. - CERTONERA, TOULOUSE CEDX, FRANCE	
*SPACE SHUTTLE LDEF-A, STUDY OF METEOROID IMPACT CRATERS ON VARIOUS MATERIAL (SSLDEF -32).....	142
*SPACE SHUTTLE LDEF-A, DUST DEBRIS COLLECTION WITH STACKED DETECTORS (SSLDEF -33).....	142
MANKIN, W.G. - NATL CTR FOR ATMOS RES, BOULDER, CO	
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
MANSON, J.B. (RETIRED) - USAF GEOPHYS LAB, BEDFORD, MA	
AE-E, SOLAR XUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
MARAN, S.P. - NASA-GSFC, GREENBELT, MD	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
MAREUS, F.A. - USAF GEOPHYS LAB, BEDFORD, MA	
AE-E, ATMOSPHERIC DENSITY ACCELEROMETER (MESA) (75-107A-02).....	13
MARGON, B. - U OF WASHINGTON, SEATTLE, WA	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	150
MARIANI, F. - U OF ROME, ROME, ITALY	
*ESA-GEOS 2, TRIAXIAL FLUXGATE MAGNETOMETER (78-071A-09).....	24
HELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	38
MASAI, K. - NAGOYA U, NAGOYA, JAPAN	
MAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MASCHER, M. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY	
SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SP-DL -02).....	137
MASON, P.V. - NASA-JPL, PASADENA, CA	
*SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	153
PASSE, P. - CENS, SACLAY, FRANCE	
HEAD 3, ISOTOPIIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
MASUNSKY, M. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ	
*GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
*GALILEO ORBITER, GEOLOGY OF THE GALILEAN SATELLITES (JOPO -15).....	116
*PIONEER VENUS 1, PARTICIPATING THEORIST MASUNSKY (78-051A-08).....	76
*VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91

VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
MATEER, C.L. - ENVIRONMENT CANADA, DOWNSVIEW, ONTARIO, CANADA	
NIMBUS 4, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (78-025A-05).....	59
NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	62
MATHER, J.C. - NASA-GSFC, GREENBELT, MD	
*CODE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (CODE -01).....	102
*CODE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (CODE -02).....	102
*CODE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (CODE -03).....	103
MATSON, D.L. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
MATSUMOTO, H. - KOBE U, KOBE, JAPAN	
EXOS-C, PRECIPITATING PARTICLE ENERGY ANALYZER (EXOS-C -04).....	112
MATSUMOTO, H. - KYOTO U, KYOTO, JAPAN	
JIKKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	95
MATSUOKA, M. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
MAKUCHI, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
*MINOTORI, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-20 KEV RANGE (81-017A-03).....	39
MATSUZAKI, A. - U OF TOKYO, TOKYO, JAPAN	
EXOS-C, INFRARED SOLAR SPECTROMETER (EXOS-C -05).....	112
MAUERSBERGER, K. - U OF MINNESOTA, MINNEAPOLIS, MN	
AE-E, OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) (75-107A-07).....	14
MAURER, J.C. - U OF MICHIGAN, ANN ARBOR, MI	
DYNAMICS EXPLORER 2, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (81-070B-03).....	21
DYNAMICS EXPLORER 2, WIND AND TEMPERATURE SPECTROMETER (81-070B-04).....	22
MAYER-HASSELWANDER, H.A. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
MAYNARD, M.C. - NASA-GSFC, GREENBELT, MD	
*DYNAMICS EXPLORER 2, ELECTRIC FIELD INVESTIGATIONS (81-070B-02).....	22
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	44
*SAN MARCO-D/L, 3-AXIS ELECTRIC FIELD INSTRUMENT (EFI) (SM-DL -05).....	137
MAYR, H.G. - NASA-GSFC, GREENBELT, MD	
*DYNAMICS EXPLORER 2, ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION (81-070B-12).....	22
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
VOIR, VENUS IONOSPHERE DYNAMICS (VOIR -08).....	170
MAZETS, E.P. - LENGRAD INST PHYS TECH, LENINGRAD, USSR	
*VENERA 11, GAMMA-RAY BURST DETECTORS (78-084A-05).....	85
*VENERA 12, GAMMA-RAY BURST DETECTORS (78-086A-05).....	89
MCAFFEE, J.R. - NOAA-ERL, BOULDER, CO	
ISEE 1, PLASMA DENSITY (77-102A-08).....	44
ISEE 2, RADIO PROPAGATION (77-102B-06).....	46
MCCONNELL, J.C. - YORK U, DOWNSVIEW, ONTARIO, CANADA	
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
MCCORD, T.B. - U OF HAWAII, HONOLULU, HI	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
MCCORMICK, M.P. - NASA-LARC, HAMPTON, VA	
*ERBS-A, STRATOSPHERIC AEROSOL AND GAS (SAGE) (ERBS-A -02).....	110
*NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II) (78-098A-06).....	64
*SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
MCCRACKEN, K.G. - CSIRO, M RYDE, NSW, AUSTRALIA	
HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	39
*PIONEER 6, COSMIC-RAY ANISOTROPY (65-105A-05).....	67
*PIONEER 9, COSMIC-RAY ANISOTROPY (68-100A-05).....	69
*PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	71
*PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	74
MC CREIGHT, C.R. - NASA-ARC, MOFFETT FIELD, CA	
SPACE SHUTTLE LDEF-A, LOW TEMPERATURE HEAT PIPE EXPERIMENT (SSLDEF -12).....	142
MCDIARMID, I.B. - NATL RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA	
*ISIS 1, ENERGETIC PARTICLE DETECTORS (69-009A-04).....	50
*ISIS 2, ENERGETIC PARTICLE DETECTORS (71-024A-04).....	52
MCDONALD, F.B. - NASA-GSFC, GREENBELT, MD	
HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	39
*IMP-J, SOLAR AND COSMIC-RAY PARTICLES (73-078A-09).....	41
ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	49
*PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	71
*PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	74
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	93
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	96
MCDONNELL, J.A.M. - U OF KENT, CANTERBURY, KENT, ENGLAND	
*GIOTTO, DUST IMPACT DETECTOR (DID) (GIOTTO -08).....	120
*OSS-1, MICROABRASION FOIL (SHOFT-4-02).....	134
*SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	142

INVESTIGATORS AND EXPERIMENTS

PAGE

MCELROY, M.D. - HARVARD U., CAMBRIDGE, MA	
*GALILEO ORBITER, INVESTIGATION OF THE JOVIAN UPPER ATMOSPHERE AND OF SATELLITE ATMOSPHERES (JOPO -16).....	116
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	75
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
MCENTIRE, R.W. - APPLIED PHYSICS LAB, LAUREL, MD	
*CCE, MEDIUM ENERGY PARTICLE ANALYZER (MEPA) (CCE -02).....	102
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
MC GILL, G.E. - U OF MASSACHUSETTS, AMHERST, MA	
*PIONEER VENUS 1, PARTICIPATING THEORIST MCGILL (78-051A-09).....	76
MCILWAIN, C.E. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	
PIONEER 10, JOVIAN TRAPPED RADIATION (72-012A-05).....	78
PIONEER 11, JOVIAN TRAPPED RADIATION (73-019A-05).....	75
MCINTOSH, JR., R. - NASA-GSFC, GREENBELT, MD	
*SPACE SHUTTLE LDEF-A, LOW TEMPERATURE HEAT PIPE EXPERIMENT (SSLDEF -12).....	142
MCKAY, D.S. - NASA-JSC, HOUSTON, TX	
SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIDS (SSLDEF -51).....	141
MCKENNA-LAWLOR, S.M.P. - ST PATRICK'S COLLEGE, MAYNOOTH, IRELAND	
*GIOTTO, ENERGETIC PARTICLES (EPA) (GIOTTO -10).....	120
MCKENZIE, D.L. - AEROSPACE CORP, EL SEGUNDO, CA	
STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	83
MC KIBBIN, D.D. - NASA-ARC, MOFFETT FIELD, CA	
PIONEER 9, ELECTROSTATIC ANALYZER (68-100A-02).....	70
PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	77
MCNULTY, P.J. - CLARKSON COLL OF TECH, POTSDAM, NY	
SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	141
MC PHERRON, R.L. - U OF CALIF, LA, LOS ANGELES, CA	
GALILEO ORBITER, MAGNETOMETER (JOPO -03).....	115
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	45
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	46
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	77
MEEGAN, C.A. - NASA-MSFC, HUNTSVILLE, AL	
GAMMA-RAY OBSERVATORY, TRANSIENT-EVENT MONITOR (GRO -05).....	119
MEGILL, L.R. - UTAH STATE U, LOGAN, UT	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	162
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	167
MELBOURNE, W.G. - NASA-JPL, PASADENA, CA	
HELIOS-A, CELESTIAL MECHANICS (74-097A-14).....	38
MELZNER, F. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
*ESA-GEOS 2, DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION (78-071A-08).....	25
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
MENDE, S.B. - LOCKHEED PALO ALTO, PALO ALTO, CA	
*SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	149
MENDILLO, M. - BOSTON U, BOSTON, MA	
*SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
MENG, C.I. - APPLIED PHYSICS LAB, LAUREL, MD	
ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	45
MESTREAU, P. - CENS, SACLAY, FRANCE	
HEAO 3, ISOTOPIIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
METZGER, A.E. - NASA-JPL, PASADENA, CA	
HEAO 3, GAMMA-RAY LINE SPECTROMETER (79-082A-11).....	36
METZNER, G. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
ESA-GEOS 2, DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION (78-071A-08).....	25
MEYER, P. - U OF CHICAGO, CHICAGO, IL	
*ISEE 3, COSMIC-RAY ELECTRONS AND NUCLEI (78-079A-06).....	48
*SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	153
MICHAEL, JR., W.M. - NASA-LARC, HAMPTON, VA	
*VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
*VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
MICHEL, F.C. - RICE U, HOUSTON, TX	
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
MICHEL, D.J. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
*STP P78-1, SOLAR WIND MONITOR (79-017A-02).....	83
MIGGENRIEDER, H. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
MIHALOV, J.D. - NASA-ARC, MOFFETT FIELD, CA	
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	77
PILKEY, R.W. - KITI PLAK NATL OPS, TUCSON, AZ	

SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
MILLER, A.J. - NOAA-NMC, WASHINGTON, DC	
NIMBUS 7, SOLAR BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	62
*UARS-1, SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS MET OLOGICAL INFORMATION (UARS-1 -16).....	162
*UARS-2, SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-2 -16).....	167
MILLER, D.E. - METEOROLOGICAL OFFICE, BERKSHIRE, ENGLAND	
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
MINER, E.D. - NASA-JPL, PASADENA, CA	
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTN) (75-075A-02).....	91
MIRNICH, M.J. - NASA-LERC, CLEVELAND, OH	
SPACE SHUTTLE LDEF-A, ION BEAM TEXTURED AND COATED SURFACES (SSLDEF -01).....	148
MIYANOTO, S. - OSAKA CITY U, OSAKA, JAPAN	
HINOTORI, SOLAR FLARE 10-40 KEV X RAYS USING ROTATING MODULATION COLLIMATOR IMAGING (81-017A-01).....	40
MIYANOTO, S. - OSAKA U, OSAKA, JAPAN	
*ASTRO-B, MADAMARD TRANSFORM TELESCOPE (ASTRO-B-02).....	101
*ASTRO-B, ALL SKY X-RAY MONITOR (ASTRO-B-03).....	101
*NAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MIYAKA, H. - U OF TOHOKU, SENDAI, JAPAN	
JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	55
MIYATAKE, T. - U OF ELECTRO-COMMUN, TOKYO, JAPAN	
JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	55
MIYAZAKI, S. - RADIO RESEARCH LAB, TOKYO, JAPAN	
*ISS-B, RETARDING POTENTIAL TRAP (78-018A-03).....	54
MIZERA, P.F. - AEROSPACE CORP, EL SEGUNDO, CA	
*STP P7B-2, SPACECRAFT SURFACE POTENTIAL MONITOR (79-007A-01).....	85
MOE, O.K. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	192
MONEY, K.E. - D+C INST OF ENVIRN MED, DOWNSVIEW, ONTARIO, CANADA	
SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	151
MONTGOMERY, M.D. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	47
MOORE, M.C. - HARVARD U, CAMBRIDGE, MA	
SPACELAB 1, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS (SPALAB1-15).....	150
MOOS, H.W. - JOHNS HOPKINS U, BALTIMORE, MD	
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
MOREELS, G. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE	
SPACELAB 1, WAVES IN THE OH EM+SSIVE LAYER (SPALAB1-19).....	148
MORENO, G. - CNR, SPACE PLASMA LAB, ROME, ITALY	
ISEE 2, SOLAR WIND IONS (77-102B-02).....	46
MORFILL, G. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY	
GALILEO ORBITER, DUST (JOPO -09).....	115
MORIOKA, A. - U OF TOHOKU, AOBAYAMA, JAPAN	
EXOS-C, TOPSIDE PLASMA SOUNDER (EXOS-C -06).....	112
JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	55
MORIYAMA, F. - U OF TOKYO, TOKYO, JAPAN	
HINOTORI, SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.7-2.0 A RANGE (81-017A-02).....	40
MORRIS, E.C. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ	
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	90
MORRISON, D.A. - NASA-JSC, HOUSTON, TX	
SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEOROIDS (SSLDEF -51).....	141
MOSIER, S.R. - NATL SCIENCE FOUND, WASHINGTON, DC	
ISEE 3, RADIO MAPPING (78-079A-10).....	49
MOUNT, G.H. - U OF COLORADO, BOULDER, CO	
*UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	162
*UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	167
MOYNOT, B. - CNES, TOULOUSE, FRANCE	
VOIR, GRAVITY, ATMOSPHERIC, AND SOLID TIDES (GASTE) (VOIR -02).....	170
MOZER, F.S. - U OF CALIF, BERKELEY, BERKELEY, CA	
*ISEE 1, QUASI-STATIC ELECTRIC FIELDS (77-102A-06).....	45
MUELLER-MELLIN, M. - U OF KIEL, KIEL, FED REP OF GERMANY	
HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	38
MUENCH, J. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	25
MUHELMAN, D. - NASA-JPL, PASADENA, CA	
VOIR, MICROWAVE ATMOSPHERIC (VOIR -05).....	170
MUKAI, T. - U OF TOKYO, TOKYO, JAPAN	

INVESTIGATORS AND EXPERIMENTS

PAGE

*EXOS-C, PRECIPITATING PARTICLE ENERGY ANALYZER (EXOS-C -04).....	112
JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-087A-06).....	80
MULLER, D. - U OF CHICAGO, CHICAGO, IL	
*SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	193
MUNCH, G. - MPI-HEIDELBERG, HEIDELBERG, FED REP OF GERMANY	
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (ITM) (75-075A-02).....	91
MUNTER, C. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY	
SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-DL -02).....	137
MURAKAMI, M. - RIKIKYO U, TOKYO, JAPAN	
EXOS-C, MONITOR OF HIGH ENERGY PARTICLES (EXOS-C -08).....	111
MURAKAMI, Y. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	181
MAKUUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MINOTORI, SOLAR FLARE 10-40 KEV X RAYS USING ROTATING MODULATION COLLIMATOR IMAGING (81-017A-01).....	40
MURASATO, S. - U OF TOKYO, TOKYO, JAPAN	
JIKIKEN, CONTROLLED ELECTRON BEAM EMISSIONS (CBE) (78-087A-07).....	55
MURCRAE, D.G. - U OF DENVER, DENVER, CO	
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	162
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	167
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
MUTCH, T.A. (DECEASED)- NASA HEADQUARTERS, WASHINGTON, DC	
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	98
NAGASE, F. - NAGOYA U, NAGOYA, JAPAN	
ASTRO-B, X-RAY REFLECTING TELESCOPE (ASTRO-B-04).....	181
MAKUUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
NAGATA, K. - TAMAGAWA U, TOKYO, JAPAN	
EXOS-C, MONITOR OF HIGH ENERGY PARTICLES (EXOS-C -08).....	111
NAGY, A.P. - U OF MICHIGAN, ANN ARBOR, MI	
DYNAMICS EXPLORER 1, RETARDING ION MASS SPECTROMETER (81-078A-04).....	18
DYNAMICS EXPLORER 2, FABRY-PEROT INTERFEROMETER (81-078B-05).....	21
*DYNAMICS EXPLORER 2, MAGNETOSPHERIC ENERGY COUPLING TO THE ATMOSPHERE INVESTIGATION (81-078B-10).....	22
PIONEER VENUS 1, LANGMUIR PROBE (75-051A-01).....	75
*PIONEER VENUS 1, PARTICIPATING THEORIST NAGY (78-051A-10).....	76
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	168
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
NAKAMURA, Y. - U OF TOKYO, TOKYO, JAPAN	
*EXOS-C, INFRARED SOLAR SPECTROMETER (EXOS-C -03).....	112
NAHEVICZ, J.E. - STANFORD RES INST, MENLO PARK, CA	
*STP P78-2, TRANSIENT PULSE MONITOR (79-087A-16).....	85
NAUMANN, R.J. - NASA-MSFC, HUNTSVILLE, AL	
SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	149
NESS, N.F. - NASA-GSFC, GREENBELT, MD	
*MELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	38
*IMP-J, MAGNETIC FIELD EXPERIMENT (73-078A-01).....	41
*VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-044A-05).....	93
*VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	95
NESS STAFF, NOAA-NESS, SUITLAND, MD	
*GOES 1, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-100A-01).....	29
*GOES 1, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (75-100A-05).....	29
*GOES 2, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (77-048A-05).....	38
*GOES 3, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (78-062A-01).....	31
*GOES 3, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (78-062A-05).....	31
*GOES 4, VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (80-074A-01).....	32
*GOES 4, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (80-074A-05).....	32
*GOES 5, VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (81-049A-01).....	33
*GOES 5, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (81-049A-05).....	33
*GOES-6, VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (80ES-F -01).....	121
*GOES-6, METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM (80ES-F -05).....	121
*NOAA 6, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (79-057A-01).....	64
*NOAA 6, OPERATIONAL VERTICAL SOUNDER (79-057A-02).....	64
*NOAA 6, DATA COLLECTION SYSTEM (79-057A-03).....	64
*NOAA 7, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (81-059A-01).....	65
*NOAA 7, OPERATIONAL VERTICAL SOUNDER (81-059A-02).....	65
*NOAA 7, DATA COLLECTION SYSTEM (DCS) (81-059A-03).....	65
*NOAA-D, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-D -01).....	128
*NOAA-D, OPERATIONAL VERTICAL SOUNDER (NOAA-D -02).....	129
*NOAA-D, DATA COLLECTION SYSTEM (DCS) (NOAA-D -03).....	129
*NOAA-E, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-E -01).....	129
*NOAA-E, OPERATIONAL VERTICAL SOUNDER (NOAA-E -02).....	130
*NOAA-E, DATA COLLECTION SYSTEM (DCS) (NOAA-E -03).....	130
*NOAA-F, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-F -01).....	131
*NOAA-F, OPERATIONAL VERTICAL SOUNDER (NOAA-F -02).....	131
*NOAA-F, DATA COLLECTION SYSTEM (DCS) (NOAA-F -03).....	131
*NOAA-G, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-G -01).....	132
*NOAA-G, OPERATIONAL VERTICAL SOUNDER (NOAA-G -02).....	132
*NOAA-G, DATA COLLECTION SYSTEM (DCS) (NOAA-G -03).....	132
*SMS 1, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (74-033A-01).....	81
*SMS 2, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (74-033A-05).....	81
*SMS 2, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-011A-04).....	82

*SRS 2, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (78-011A-05).....	82
*TIROS-N, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (78-096A-01).....	86
*TIROS-N, OPERATIONAL VERTICAL SOUNDER (78-096A-02).....	86
*TIROS-N, DATA COLLECTION SYSTEM (DCS) (78-096A-03).....	87
NEUBAUER, F.M. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY	
*GIOTTO, MAGNETOMETER (MAG) (GIOTTO-07).....	120
*MELIOS-A, FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS (74-097A-01).....	38
*MELIOS-A, SEARCH COIL MAGNETOMETER (74-097A-03).....	38
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	93
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	95
NEUGEBAUER, G. - CALIF INST OF TECH, PASADENA, CA	
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	73
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	91
NEUMANN, G. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
NEWELL, R.E. - MASS INST OF TECH, CAMBRIDGE, MA	
OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1-04).....	136
NEWTON, G.P. - NASA HEADQUARTERS, WASHINGTON, DC	
DYNAMICS EXPLORER 2, ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION (81-070B-12).....	22
NICHOLS, R.L. - NASA-MSFC, HUNTSVILLE, AL	
*SPACE SHUTTLE LDEF-A, EFFECTS OF SOLAR RADIATION ON GLASSES (SSLDEF-44).....	143
NICOLAS, K.R. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	152
NIELSEN, K.F. - TECH U OF DENMARK, LYNGBY, DENMARK	
SPACE SHUTTLE LDEF-A, GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW GRAVITY (SSLDEF-17).....	142
NIEMANN, H.B. - NASA-GSFC, GREENBELT, MD	
AL-E, NEUTRAL ATMOSPHERE TEMPERATURE (NATE) (75-107A-09).....	15
DYNAMICS EXPLORER 2, WIND AND TEMPERATURE SPECTROMETER (81-070B-04).....	22
*GALILEO PROBE, MASS SPECTROMETER (JOP -05).....	118
*PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11).....	76
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
NIER, A.O.C. - U OF MINNESOTA, MINNEAPOLIS, MN	
*AE-E, OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) (75-107A-07).....	14
NISHI, K. - U OF TOKYO, TOKYO, JAPAN	
*MINOTORI, SOLAR FLARE X-RAY RAGG SPECTROSCOPY IN 1.7-2.0 A RANGE (81-017A-02).....	40
NISHIDA, A. - U OF TOKYO, TOKYO, JAPAN	
JKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	55
NONE ASSIGNED	
*IUE, PARTICLE FLUX MONITOR (SPACECRAFT) (78-012A-02).....	54
*SPACELAB 3, RESEARCH ANIMAL HOLDING FACILITY (RAHF) (SPALAB3-11).....	156
NORMAN, K. - U COLLEGE LONDON, LONDON, ENGLAND	
ESA-GEOS 2, THERMAL PLASMA FLOW (78-071A-02).....	26
NORTON, R. - NASA-JPL, PASADENA, CA	
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMJS) (SPALAB3-14).....	155
NORTON, R.W. - NOAA-ERL, BOULDER, CO	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-089A-01).....	51
ISIS 1, FIXED-FREQUENCY SOUNDER (69-089A-02).....	50
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	53
ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	52
NOVICK, R. - COLUMBIA U, NEW YORK, NY	
HEAD 2, MONITOR PROPORTIONAL COUNTER (MPC) (78-103A-01).....	35
HEAD 2, HIGH-RESOLUTION IMAGER (HRI) (78-103A-02).....	35
HEAD 2, FOCAL PLANE CRYSTAL SPECTROMETER (FPCS) (78-103A-03).....	35
HEAD 2, IMAGING PROPORTIONAL COUNTER (IPC) (78-103A-04).....	35
*OSS-1, SOLAR FLARE X-RAY POLARIMETER EXPERIMENT (SHUFT-4-02).....	134
NOXON, J.F. - NOAA, BOULDER, CO	
SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
NULL, G.W. - NASA-JPL, PASADENA, CA	
PIONEER 10, CELESTIAL MECHANICS (72-012A-09).....	70
PIONEER 11, CELESTIAL MECHANICS (73-019A-09).....	73
O'DELL, F.W. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SPACE SHUTTLE LDEF-A, HEAVY IONS IN SPACE (SSLDEF-13).....	144
O'GALLAGHER, J.J. - U OF MARYLAND, COLLEGE PARK, MD	
ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	44
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48
PIONEER 10, CHARGED PARTICLE COMPOSITION (72-012A-02).....	72
PIONEER 11, CHARGED PARTICLE COMPOSITION (73-019A-02).....	74
O'NEAL, R.L. - NASA-LARC, HAMPTON, VA	
PIONEER 10, METEOROID DETECTORS (72-012A-04).....	71
O'SULLIVAN, D. - DUBLIN INST ADV STUDY, DUBLIN, IRELAND	

INVESTIGATORS AND EXPERIMENTS

PAGE

*SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	143
OBAYASHI, T. - U OF TOKYO, TOKYO, JAPAN	
*SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	149
OGATA, Y. - RADIO RESEARCH LAB, TOKYO, JAPAN	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	91
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	93
OGAWA, T. - KYOTO U, KYOTO, JAPAN	
JIKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	89
OGAWA, T. - U OF TOKYO, TOKYO, JAPAN	
*EXOS-C, ULTRAVIOLET SPECTROMETER (EXOS-C -02).....	112
OGAWARA, Y. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
*HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
HINOTORI, SOLAR FLARE 10-40 KEV X RAYS USING ROTATING MODULATION COLLIMATOR IMAGING (81-017A-01).....	40
OGILVIE, K.W. - NASA-GSFC, GREENBELT, MD	
*ISEE 1, FAST ELECTRONS (77-102A-02).....	45
*ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	40
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
OHASHI, T. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
*HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
ONTSU, J. - NAGOYA U, NAGOYA, JAPAN	
JIKIKEN, NATURAL PLASMA WAVES (NPM) (78-087A-02).....	95
OKI, K. - U OF TOKYO, TOKYO, JAPAN	
HINOTORI, SOLAR FLARE 10-40 KEV X RAYS USING ROTATING MODULATION COLLIMATOR IMAGING (81-017A-01).....	40
OKUDAIRA, K. - RIKKYO U, TOKYO, JAPAN	
HINOTORI, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.2-9.0 MEV RANGE (81-017A-04).....	39
OLBERT, S. - MASS INST OF TECH, CAMBRIDGE, MA	
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
OLLENDORF, S. - NASA-GSFC, GREENBELT, MD	
*OSS-1, THERMAL CANISTER EXPERIMENT (SHOFT-4-05).....	134
SPACE SHUTTLE LDEF-A, LOW TEMPERATURE HEAT PIPE EXPERIMENT (SSLDEF -12).....	142
OLSON, R.A. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75
OMAN, C.A. - MASS INST OF TECH, CAMBRIDGE, MA	
*SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	151
ONO, T. - U OF TOKYO, SENDAI, JAPAN	
JIKIKEN, STIMULATED PLASMA WAVE (SPW) (78-087A-01).....	55
ORTON, G.S. - NASA-JPL, PASADENA, CA	
*GALILEO ORBITER, GROUND-TRUTH ANALYSIS OF RADIATIVE TRANSFER IN THE ATMOSPHERE OF JUPITER (JOPO -17).....	116
ORWIG, L.E. - NASA-GSFC, GREENBELT, MD	
*SMX, HARD X-RAY BURST SPECTROMETER (HXRB) (80-014A-06).....	79
OWEN, T. - STATE U OF NEW YORK, BUFFALO, NY	
*GALILEO ORBITER, COMPOSITION OF THE JOVIAN ATMOSPHERE (JOPO -18).....	116
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	118
OWEN, T. - STATE U OF NEW YORK, STONY BROOK, NY	
VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
OYA, M. - U OF TOKYO, AOMORI, JAPAN	
*EXOS-C, TOPSIDE PLASMA SOUNDER (EXOS-C -06).....	112
EXOS-C, PLASMA PROBES (EXOS-C -07).....	112
HINOTORI, PLASMA PROBES (81-017A-06).....	39
JIKIKEN, STIMULATED PLASMA WAVE (SPW) (78-087A-01).....	55
JIKIKEN, NATURAL PLASMA WAVES (NPM) (78-087A-02).....	95
OYAMA, K. - U OF TOKYO, TOKYO, JAPAN	
EXOS-C, PLASMA PROBES (EXOS-C -07).....	112
HINOTORI, PLASMA PROBES (81-017A-06).....	39
PAGE, D.E. - ESA-ESTEC, VOORDWIJK, NETHERLANDS	
ISEE 3, ENERGETIC PROTONS (78-079A-08).....	48
PAILLIOUS, A. - CERTONERA, TOULOUSE CEDEX, FRANCE	
*SPACE SHUTTLE LDEF-A, THERMAL COATINGS AND STRUCTURAL MATERIAL (SSLDEF -34).....	143
PALLUCONI, F.L. - NASA-JPL, PASADENA, CA	
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	91
PALMER, F.M. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
ISIS 1, VLF RECEIVER (69-009A-03).....	50
ISIS 2, VLF RECEIVER (71-024A-03).....	52
PAN, C.H.T. - SHAKER RESEARCH CORP, BALLSTON LAKE, NY	
*SPACELAB 1, BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G (SPALAB1-09).....	149
PANG, K. - NASA-JPL, PASADENA, CA	

VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 Å (77-076A-11).....	95
PAPAGIANNIS, M.D. - BOSTON U, BOSTON, MA SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
PARESC, F. - U OF CALIF, BERKELEY, BERKELEY, CA EUVE, EXTREME ULTRAVIOLET FULL-SKY SURVEY (EUVE -01).....	111
PARK, C.G. - STANFORD U, PALO ALTO, CA DYNAMICS EXPLORER 1, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (B1-070A-08).....	19
PARK, J. - COLL OF WILLIAM & MARY, WILLIAMSBURG, VA UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	163
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	160
PARKINSON, J.M. - U COLLEGE LONDON, LONDON, ENGLAND SMM, SOFT X-RAY POLYCHROMATOR (XRP) (E0-014A-04).....	79
PARKS, G.K. - U OF WASHINGTON, SEATTLE, WA ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	45
PARNELL, T.A. - NASA-MSFC, HUNTSVILLE, AL GAMMA-RAY OBSERVATORY, TRANSIENT-EVENT MONITOR (GRO -05).....	119
PASCHMANN, G. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY CCE, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCE -03).....	101
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
PASTIELS, R. - IASB, BRUSSELS, BELGIUM SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	150
PATCHETT, B.E. - RUTHERFORD/APPLTON LAB, CHILTON, ENGLAND SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	153
PEACOCK, A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145
PEACOCK, C.L. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	141
PEARCE, J.B. - RADIOPHYSICS, INC, BOULDER, CO VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
PEARL, J.C. - NASA-GSFC, GREENBELT, MD VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
PEDERSEN, A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	25
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	114
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	75
PELLAT, R. - CTR FOR THEORETIC PHYS, PARIS, FRANCE ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	45
PELLKOEFER, H. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY HELIOS-A, PLASMA DETECTORS (74-097A-09).....	39
PELTZER, R.G. - MARTIN-MARIETTA AEROSP, DENVER, CO VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
PENNER, J.E. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	160
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	164
PEPIN, T.J. - U OF WYOMING, LARAMIE, WY NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-11 (SAM-11) (78-098A-06).....	64
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
STP P78-1, PRELIMINARY AEROSOL MONITOR (79-017A-07).....	83
PESKETT, G.D. - OXFORD U, OXFORD, ENGLAND NIMBUS 6, PRESSURE MODULATED RADIOMETER (PMR) (75-052A-09).....	61
NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	62
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
PETERS, B. - DANISH SPACE RES INST, LYNGBY, DENMARK HEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
PETERS, L.K. - U OF KENTUCKY, LEXINGTON, KY OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
PETERS, P.N. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE (SSLDEF -19).....	141
PETERSON, A.M. - STANFORD U, PALO ALTO, CA PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	69
PETERSON, D.D. - U OF CALIF, SAN FRANC., SAN FRANCISCO, CA SPACELAB 1, HZE-PARTICLE DOSIMETRY (SPALAB1-11).....	146
PETERSON, L.E. - U OF CALIF, SAN DIEGO, LA JOLLA, CA HEAO 3, GAMMA-RAY LINE SPECTROMETER (79-062A-01).....	36

PETIT, M. - CNET, ISSY-LES-MOULINEAUX, FRANCE	
ESA-GEOS 2, VLF PLASMA RESONANCES (78-071A-05).....	25
ISEE 1, PLASMA DENSITY (77-102A-08).....	44
ISEE 2, RADIO PROPAGATION (77-102B-06).....	46
PETRAC, D. - NASA-JPL, PASADENA, CA	
SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	153
PETRIE, C.E. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	51
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	53
PETROU, N. - CEN, SACLAY, FRANCE	
NEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
PETTENGILL, G. - MASS INST OF TECH, CAMBRIDGE, MA	
PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	77
VOIR, SYNTHETIC APERTURE RADAR (SAR) (VOIR -01).....	170
PFEIFFER, G.W. - U OF IOWA, IOWA CITY, IA	
IMP-J, ELECTROSTATIC WAVES AND RADIO NOISE (73-078A-12).....	41
PFOTZ, G. (RETIRED) - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	25
PHARO, III, M.W. - NASA-GSFC, GREENBELT, MD	
AE-E, HENNETT ION-MASS SPECTROMETER (BIMS) (75-107A-10).....	12
PHILLIPS, R. - NASA-JPL, PASADENA, CA	
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	75
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-074A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
PILCHER, C.B. - U OF HAWAII, HONOLULU, HI	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
PINKAU, K. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	116
SMM, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
PIRRAGLIA, J.A. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
PIRRE, M. - CNRS, ORLEANS, FRANCE	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
PISARENKO, N.F. - IKI, MOSCOW, USSR	
VENERA 11, PROTON SPECTROMETER (78-084A-06).....	88
VENERA 12, PROTON SPECTROMETER (78-086A-06).....	89
PITCHER, E.J. - U OF MIAMI, MIAMI, FL	
UARS-1, OBSERV ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-1 -20).....	160
UARS-2, OBSERV ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-2 -20).....	165
PIT, L. - MPI-ASTRONOMIE, HEIDELBERG, FED REP OF GERMANY	
HELIOS-A, ZODIACAL LIGHT PHOTOMETER (74-097A-11).....	38
PLANET, W.G. - NOAA-NESS, SUITLAND, MD	
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
PLEASANTS, J.E. - NASA-LARC, HAMPTON, VA	
ERBS-A, STRATOSPHERIC AEROSOL AND GAS (SAGE) (ERBS-A -02).....	110
PNEUMAN, G.W. - HIGH ALTITUDE OBS, BOULDER, CO	
SMM, CORONAGRAPH/POLARIMETER (80-014A-01).....	80
POLLACK, J.B. - NASA-ARC, MOFFETT FIELD, CA	
GALILEO ORBITER, THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE (JOPO -19).....	116
GALILEO PROBE, NET FLUX RADIOMETER (JOP -04).....	117
GALILEO PROBE, NEPHELOMETER (JOP -05).....	118
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	90
PONGRATZ, M.B. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
PONNAMPERUMA, C.A. - U OF MARYLAND, COLLEGE PARK, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
POTERNA, T.A. - APPLIED PHYSICS LAB, LAUREL, MD	
TIP 1, TRIAXIAL FLUXGATE MAGNETOMETER (72-069A-01).....	86
UARS-2, MAGNETOMETER EXPERIMENT (UARS-2 -26).....	167
POTTER, W.E. - U OF MINNESOTA, MINNEAPOLIS, MN	
AE-E, OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) (75-107A-07).....	14
POUNDS, K.A. - U OF LEICESTER, LEICESTER, ENGLAND	
EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	113
OUR 6, X-RAY PROPORTIONAL COUNTERS (79-047A-02).....	87
POWELL, J.M. - ROCKWELL INTL CORP, TULSA, OK	
SPACE SHUTTLE LDEF-A, GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE (SSSDEF -35).....	143
POWER, J.L. - NASA-LERC, CLEVELAND, OH	
STP PRO-1, ION AUXILIARY PROPULSION SYSTEM (PRO-1 -02).....	159

PREUSS, L. - MBB SPACE DIV, MUNICH, FED REP OF GERMANY SPACE SHUTTLE LDEF-A, CRITICAL SURFACE DEGRADATION EFFECTS ON COATINGS AND SOLAR CELLS (SSLDEF -46).....	143
PRINZ, D.K. - US NAVAL RESEARCH LAB, WASHINGTON, DC OSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SHOFT-4-03).....	133
SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11).....	102
UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -00).....	109
UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -00).....	104
PURDY, C.L. - NASA-WFC, Wallops Island, VA GEOS 3, RADAR ALTIMETER SYSTEM (75-027A-01).....	27
QUERFELD, C.W. - HIGH ALTITUDE OBS, BOULDER, CO SMN, CORONAGRAPH/POLARIMETER (88-014A-01).....	80
QUIROZ, R.S. - NOAA-NMC, WASHINGTON, DC UARS-1, SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-1 -16).....	162
UARS-2, SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-2 -16).....	167
RAGENT, B. - NASA-ARC, MOFFETT FIELD, CA GALILEO PROBE, NEPHELOMETER (JOP -05).....	118
RAGHAVARAO, R. - PHYSICAL RESEARCH LAB, AHMEDABAD, INDIA ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	91
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	93
RAITT, W.J. - UTAH STATE U, LOGAN, UT ESA-GEOS 2, THERMAL PLASMA FLOW (78-071A-02).....	26
OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-4-04).....	133
RAMSEIR, R.O. - ENVIRONMENT CANADA, DOWNSVIEW, ONTARIO, CANADA NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMNR) (78-090A-00).....	62
RAMSEY, M.E. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-00).....	154
RAND, J.L. - TEXAS A-M, COLLEGE STATION, TX SPACE SHUTTLE LDEF-A, BALLOON MATERIALS DEGRADATION (SSLDEF -38).....	143
RAO, U.R. - ISRO SATELLITE CENTER, BANGALORE, INDIA PIONEER 6, COSMIC-RAY ANISOTROPY (65-105A-05).....	67
PIONEER 9, COSMIC-RAY ANISOTROPY (68-100A-05).....	69
RAPER, D. - NASA-JPL, PASADENA, CA SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
RAPLEY, C.G. - U COLLEGE LONDON, LONDON, ENGLAND SMN, SOFT X-RAY POLYCHROMATOR (XRP) (88-014A-04).....	79
RASMUSSEN, I. - DANISH SPACE RES INST, LYNGBY, DENMARK HEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-002A-04).....	36
RASOOL, S.I. - NASA HEADQUARTERS, WASHINGTON, DC PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	71
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	74
REAGAN, J.B. - LOCKHEED PALO ALTO, PALO ALTO, CA DYNAMICS EXPLORER 1, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (01-070A-00).....	19
STP P78-2, HIGH-ENERGY PARTICLE DETECTOR (79-007A-15).....	85
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	168
REASENBERG, R. - MASS INST OF TECH, CAMBRIDGE, MA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
REASONER, D.L. - NASA-MSFC, HUNTSVILLE, AL OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	134
SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	149
REBER, C.A. - NASA-GSFC, GREENBELT, MD AE-E, NEUTRAL ATMOSPHERE COMPOSITION (INACE) (75-107A-02).....	14
DYNAMICS EXPLORER 2, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (01-070B-03).....	21
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	162
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	167
REES, D. - U COLLEGE LONDON, LONDON, ENGLAND DYNAMICS EXPLORER 2, FABRY-PEROT INTERFEROMETER (01-070B-05).....	21
UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02).....	161
UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	166
REES, M.M. - U OF ALASKA, FAIRBANKS, ALASKA UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	168
REICHEL, JR., M.G. - NASA-LARC, HAMPTON, VA OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
REID, G.C. - NOAA, BOULDER, CO UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	168
REINHOLDT, E.J. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, LARGE SPACE STRUCTURE LIGHTING EVALUATION (SSLDEF -47).....	142
REITER, E.P. - COLORADO STATE U, FORT COLLINS, CO UARS-1, GLIMPSE:GLOBAL LIMO PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	160
UARS-2, GLIMPSE:GLOBAL LIMO PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	164

REITZ, G. - U OF FRANKFURT, FRANKFURT, FED REP OF GERMANY SPACELAB 1, MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT (SPALAB1-34).....	149
RENE, M. - CERN, TOULOUSE, FRANCE *GIOTTO, ELECTRON ESA AND POSITIVE ION CLUSTER COMPOSITION ANALYZER (CPA) (GIOTTO -06).....	121
ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	43
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	45
RENSBERG, E.E. - NASA-LARC, HAMPTON, VA UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-1 -22).....	161
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-2 -22).....	165
REPPIN, C. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY SMR, GAMMA-RAY SPECTROMETER (GRE) (88-014A-07).....	79
RESCHKE, M.F. - NASA-JSC, HOUSTON, TX *SPACELAB 1, VESTIBULO-SPINAL REFLEX MECHANISMS (SPALAB1-16).....	149
REYNOLDS, M. - ESA-TOULOUSE, TOULOUSE, FRANCE *METEOSAT 2, IMAGING RADIOMETER (81-057A-01).....	59
RICE, C.J. - AEROSPACE CORP, EL SEGUNDO, CA *AL-E, CAPACITANCE MANOMETER (75-107A-12).....	14
*AE-E, COLD CATHODE ION GAUGE (75-107A-13).....	15
RICHARD, H.L. - NASA-GSFC, GREENBELT, MD NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
RIDDLE, A.C. - U OF COLORADO, BOULDER, CO VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
RIEDLER, W. - TECH U OF GRAZ, GRAZ, AUSTRIA SPACELAB 1, STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION (SPALAB1-24).....	151
RIEGER, E. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY SMR, GAMMA-RAY SPECTROMETER (GRE) (88-014A-07).....	79
RIEKE, G.W. - U OF ARIZONA, TUCSON, AZ SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
RINNERT, K. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY *GALILEO PROBE, LIGHTNING (JOP -06).....	117
RIO, Y. - CENS, SACLAY, FRANCE HEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
ROBERTS, W.T. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	149
ROBERTSON, J.B. - NASA-LARC, HAMPTON, VA *SPACE SHUTTLE LDEF-A, EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS (SSLDEF -18).....	143
ROBINSON, E.L. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	157
ROBINSON, JR., G.A. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, TRANSVERSE FLAT PLATE HEAT PIPE PERFORMANCE (SSLDEF -37).....	143
ROBLE, R.G. - NATL CTR FOR ATMOS RES, BOULDER, CO DYNAMICS EXPLORER 2, FABRY-PEROT INTERFEROMETER (81-070D-05).....	21
DYNAMICS EXPLORER 2, NEUTRAL-PLASMA INTERACTIONS INVESTIGATION (81-070D-11).....	22
UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02).....	161
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	166
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	160
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
ROCHE, A.E. - LOCKHEED PALO ALTO, PALO ALTO, CA *UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	162
*UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	167
ROCKE, F. - U OF BERLIN, BERLIN, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	148
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.M., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	148
RODGERS, C.D. - OXFORD U, OXFORD, ENGLAND NIMBUS 6, PRESSURE MODULATED RADIOMETER (PMR) (75-052A-09).....	61
NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	62
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
ROEDERER, J.G. - U OF ALASKA, COLLEGE, ALASKA *GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
ROELOF, E.C. - APPLIED PHYSICS LAB, LAUREL, MD *GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	39
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	71
PIONEER 11, COSMIC-RAY SPECTRA (75-019A-12).....	74
ROGERSON, JR., J. - PRINCETON U, PRINCETON, NJ DAO 3, HIGH-RESOLUTION TELESCOPES (72-065A-01).....	66

ROSE, R.C. (RETIRED)- NATL RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA ISIS 1, ENERGETIC PARTICLE DETECTORS (69-009A-04).....	90
ROSENDAUER, H.D. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY CCL, PLASMA COMPOSITION (CCL -01).....	102
CEA-4003 2, LOW-ENERGY ION COMPOSITION (76-071A-03).....	84
CHLLOS-A, PLASMA DETECTORS (74-097A-09).....	39
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
ISEE 1, ION COMPOSITION (77-102A-12).....	48
ISPM/NASA, MASS SEPARATING SOLAR WIND (SWS) (ISPMASA-04).....	126
ISPM/NASA, DIRECT MEASUREMENT OF INTERSTELLAR GAS USING HE AS TRACER (HGM) (ISPMASA-07).....	126
ROSS, D.D. - NOAA-ERL, BOULDER, CO NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMWR) (78-098A-00).....	62
ROSS, M. - U OF STIRLING, STIRLING, SCOTLAND SPACELAB 1, MASS DISCRIMINATION DURING WEIGHTLESSNESS (SPALAB1-30).....	130
ROSSI, M. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LDEF-A, EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS (SSLDEF -20).....	141
ROTHENBERG, M. - DANISH SPACE RES INST, LYMBY, DENMARK NEAS 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-002A-04).....	36
ROTHMEL, M. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	114
ROTHWELL, P.L. - USAF GEOPHYS LAB, BEDFORD, MA DMSP 5D-1/F4, PRECIPITATING ELECTRON SPECTROMETER (79-050A-03).....	17
DMSP 5D-1/F5, PRECIPITATING ELECTRON SPECTROMETER (DMSP-F5-03).....	103
DMSP 5D-2/F10, PRECIPITATING ELECTRON/ION SPECTROMETER (DMSPF10-04).....	105
DMSP 5D-2/F6, PRECIPITATING ELECTRON/ION SPECTROMETER (DMSP-F6-05).....	106
DMSP 5D-2/F7, PRECIPITATING ELECTRON/ION SPECTROMETER (DMSP-F7-05).....	107
DMSP 5D-2/F8, PRECIPITATING ELECTRON/ION SPECTROMETER (DMSP-F8-03).....	108
DMSP 5D-2/F9, PRECIPITATING ELECTRON/ION SPECTROMETER (DMSP-F9-04).....	109
ROTHMAN, G.J. - U OF COLORADO, BOULDER, CO SME, UV /ZONE (SME -01).....	136
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.2 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
UARS-1, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-1 -04).....	163
UARS-2, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-2 -04).....	167
ROMAN, L.C. - US GEOLOGICAL SURVEY, RESTON, VA OSTA-1, SHUTTLE MULTISPECTRAL INFRARED RADIOMETER (SMIRR) (OSTA-1 -02).....	135
RUDMANN, A.A. - NASA-GSFC, GREENBELT, MD NOAA-F, EARTH RADIATION BUDGET INSTRUMENT (ERDI) (NOAA-F -05).....	130
NOAA-G, EARTH RADIATION BUDGET INSTRUMENT (ERDI) (NOAA-G -05).....	132
RUFF, I. - NOAA-NESS, SUITLAND, MD NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	61
RUSCH, D.W. - U OF COLORADO, BOULDER, CO UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	162
UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	167
VOIR, AIRGLOW PHOTOMETER (VOIR -04).....	170
RUSSELL, C.T. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, MAGNETOMETER (JOPO -03).....	7
GALILEO ORBITER, JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS (JOPO -20).....	7
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	7
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	7
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	7
RUSSELL, P.D. - SRI INTERNATIONAL, MENLO PARK, CA NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-11 (SAM-11) (78-098A-06).....	64
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	78
RUSSELL, 3RD, J.M. - NASA-LARC, HAMPTON, VA EROS-A, HALOGEN OCCULTATION (HALOE) (EROS-A -03).....	110
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	163
UARS-1, ADVANCED LIDAR SCANNER (UARS-1 -10).....	160
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIDAR EMISSION RADIOMETER (UARS-1 -12).....	160
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	166
UARS-2, ADVANCED LIDAR SCANNER (UARS-2 -10).....	165
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIDAR EMISSION RADIOMETER (UARS-2 -12).....	165
RYAN, J.A. - CALIF ST U, FULLERTON, FULLERTON, CA VIRING 1 LANDER, METEOROLOGY (75-075C-07).....	90
SAFFREN, R.M. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	153
SAGALYN, R.C. - USAF GEOPHYS LAB, BEDFORD, MA DMSP 5D-1/F4, IONOSPHERIC PLASMA MONITOR (79-050A-05).....	10
DMSP 5D-1/F5, IONOSPHERIC PLASMA MONITOR (DMSP-F5-05).....	104
DMSP 5D-2/F10, IONOSPHERIC/SCINTILLATION MONITOR (DMSPF10-03).....	105
DMSP 5D-2/F6, IONOSPHERIC PLASMA MONITOR (DMSP-F6-04).....	106
DMSP 5D-2/F7, IONOSPHERIC PLASMA MONITOR (DMSP-F7-04).....	107
DMSP 5D-2/F8, IONOSPHERIC/SCINTILLATION MONITOR (DMSP-F8-02).....	108
DMSP 5D-2/F9, IONOSPHERIC/SCINTILLATION MONITOR (DMSP-F9-03).....	110
ISIS 1, SPHERICAL ELECTROSTATIC ANALYZER (6V-009A-04).....	51

SAGAN, C. - CORNELL U, ITHACA, NY	
*GALILEO ORBITER, ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE (JOP0 -01).....	116
VIRING 1 LANDER, LANDER IMAGING (75-075C-00).....	90
VOYAGER 1, IMAGING (77-004A-01).....	95
VOYAGER 2, IMAGING (77-076A-01).....	95
SALENI, S. - U OF PALERMO, PALERMO, ITALY	
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-00).....	140
SALZBERG, I.M. - NASA-GSFC, GREENBELT, MD	
*GOS 3, S-BAND TRACKING SYSTEM (75-027A-02).....	27
SARIN, M. - U OF MICHIGAN, ANN ARBOR, MI	
OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-4-04).....	133
SAMUELSON, R.E. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-004A-03).....	92
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	94
SANATANI, S. - U OF TEXAS, DALLAS, RICHARDSON, TX	
AE-R, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	13
SANDEL, M.R. - U OF SOUTHERN CALIF, TUCSON, AZ	
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	100
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-004A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
SANDERSON, T.R. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
ISEE 3, ENERGETIC PROTONS (75-079A-00).....	40
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
SANFORD, P.W. - U COLLEGE LONDON, LONDON, ENGLAND	
EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	113
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
OAO 3, STELLAR X RAYS (72-060A-02).....	66
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-20).....	145
SAR INVEST. GROUP. SEE APPENDIX B	
VOIR, SYNTHETIC APERTURE RADAR (SAR) (VOIR -01).....	170
SARKAR, S. - TATA INST OF FUND RES, BOMBAY, INDIA	
SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	155
SATO, M. - NASA-GISS, NEW YORK, NY	
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	90
SAUER, M.M. - NOAA-ERL, BOULDER, CO	
GOES 1, ENERGETIC PARTICLE MONITOR (75-100A-02).....	29
GOES 2, ENERGETIC PARTICLE MONITOR (77-040A-02).....	30
GOES 3, ENERGETIC PARTICLE MONITOR (75-062A-02).....	31
GOES 4, ENERGETIC PARTICLE MONITOR (60-074A-02).....	32
GOES 5, ENERGETIC PARTICLE MONITOR (81-049A-02).....	33
GOES-7, ENERGETIC PARTICLE MONITOR (GOES-7 -02).....	121
NOAA 7, SPACE ENVIRONMENT MONITOR (81-059A-04).....	66
NOAA-9, SPACE ENVIRONMENT MONITOR (NOAA-9 -04).....	129
NOAA-E, SPACE ENVIRONMENT MONITOR (NOAA-E -04).....	130
NOAA-F, SPACE ENVIRONMENT MONITOR (NOAA-F -04).....	131
NOAA-G, SPACE ENVIRONMENT MONITOR (NOAA-G -04).....	132
SMS 1, ENERGETIC PARTICLE MONITOR (74-033A-02).....	81
SMS 2, ENERGETIC PARTICLE MONITOR (75-011A-01).....	82
SAUNDERS, R.S. - NASA-JPL, PASADENA, CA	
OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
SAVAGE, B.D. - U OF WISCONSIN, MARISON, WI	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LS7 -02).....	157
SAVICH, M.A. - IRE, MOSCOW, USSR	
*VENERA 11, TWO-FREQUENCY TRANSMITTERS (78-004A-07).....	88
*VENERA 12, PROTON SPECTROMETER (78-006A-07).....	89
SAWYER, C.D. - HIGH ALTITUDE OPS, BOULDER, CO	
SM, CORONAGRAPH/PHOTOLIMETER (80-014A-01).....	80
SEANO, A. - U OF ROME, ROME, ITALY	
*SPACELAB 1, HALLISTOCARDIOGRAPHIC RESEARCH IN HEIGHTLESSNESS (SPALAB1-33).....	150
SCARF, F.L. - TRW SYSTEMS GROUP, REDONDO BEACH, CA	
*GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOP0 -07).....	118
*GALILEO ORBITER, WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER (JOP0 -22).....	116
ISEE 1, PLASMA WAVES (77-102A-07).....	44
ISEE 2, PLASMA WAVES (77-1020-05).....	46
ISEE 3, PLASMA WAVES (78-079A-07).....	48
*PIONEER 9, PLASMA WAVE DETECTOR (64-100A-07).....	69
PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
*PIONEER VENUS 1, ELECTRIC FIELD DETECTOR (78-051A-13).....	77
*VOYAGER 1, PLASMA WAVE (.01-.56 KHz) (77-004A-13).....	93
*VOYAGER 2, PLASMA WAVE (.01-.56 KHz) (77-076A-13).....	95
SCARSI, L. - U OF PALERMO, PALERMO, ITALY	
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-20).....	145
SCIENCE, C.S. - NASA-GSFC, GREENBELT, MD	
IMP-J, MAGNETIC FIELD EXPERIMENT (73-079A-01).....	41

SCHABER, G. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ OSTA-1, SHUTTLE IMAGING RADAR-A (SIR-A) (OSTA-1 -01).....	135
SCHALL, P. - AEROSPACE CORP, EL SEGUNDO, CA SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS (SSLDEF -15).....	143
SCHAPPELL, R.T. - MARTIN-MARIETTA AEROSP, DENVER, CO OSTA-1, FEATURE IDENTIFICATION AND LOCATION (FILE) (OSTA-1 -03).....	136
SCHARDY, A.W. - NASA-GSFC, GREENBELT, MD VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	93
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	96
SCHELD, H.W. - U OF HOUSTON, HOUSTON, TX OSS-1, INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS (SHOFT-4-07).....	133
SPACELAB 2, INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION (SPALAB2-02).....	152
SCHERB, F. - U OF WISCONSIN, MADISON, WI PIONEER 6, SOLAR WIND PLASMA FARADAY CUP (65-105A-02).....	67
SCHERER, W. - U OF MUNICH, MUNICH, FED REP OF GERMANY SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-41).....	151
SCHIEBER, M.M. - LGT INC, GOLETA, CA SPACELAB 3, VAPOR CRYSTAL GROWTH SYSTEM (VCGS) (SPALAB3-02).....	156
SCHINDLER, K. - RUHR-UNIVERSITAT BOCHUM, BOCHUM, FED REP OF GERMANY ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
SCHINDLER, R. - NASA-JPL, PASADENA, CA SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
SCHMIDT, H.U. - MPI-PHYS ASTROPHYS, GARCHING, FED REP OF GERMANY SM, CORONAGRAPH/POLARIMETER (80-014A-01).....	60
SCHMIDTKE, G. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SN-DL -02).....	137
SCHNEID, E.J. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
SCHNEPPLE, M.F. - EG&G INC, GOLETA, CA SPACELAB 3, VAPOR CRYSTAL GROWTH SYSTEM (VCGS) (SPALAB3-02).....	156
SCHNOES, H.K. - U OF WISCONSIN, MADISON, WI SPACELAB 2, VITAMIN D METABOLITES AND BONE DEMINERALIZATION (SPALAB2-01).....	154
SCHOLER, W. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	44
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48
SCHOLES, W.J. - EPPLEY LAB, INC, NEWPORT, RI NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	61
SCHONFELDER, V. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
SCHOOLMAN, S.A. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
SCHUBERT, G. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
GALILEO ORBITER, JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION (JOPO -23).....	117
GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	118
PIONEER VENUS 1, PARTICIPATING THEORIST SCHUBERT (78-051A-14).....	77
SCHURMAN, D.W. - U OF FLORIDA, GAINESVILLE, FL OSS-1, CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE (SHOFT-4-06).....	134
SCOTT, JR., R.L. - SOUTHERN U, BATON ROUGE, LA SPACE SHUTTLE LDEF-A, ATOMIC OXYGEN STIMULATED OUTGASSING (SSLDEF -07).....	144
SCHODDER, J.D. - NASA-GSFC, GREENBELT, MD ISEE 1, FAST ELECTRONS (77-102A-02).....	45
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
SEALE, R. - NOAA-ERL, BOULDER, CO NOAA 6, SPACE ENVIRONMENT MONITOR (79-057A-04).....	65
TIROS-N, SPACE ENVIRONMENT MONITOR (78-096A-04).....	87
SEARS, R.D. - LOCKHEED PALO ALTO, PALO ALTO, CA UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	162
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	167
SEEK, J.B. - NASA-GSFC, GREENBELT, MD IMP-J, MAGNETIC FIELD EXPERIMENT (73-078A-01).....	41
SEELEY, J.S. - READING U, READING, ENGLAND SPACE SHUTTLE LDEF-A, HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS (SSLDEF -23).....	144
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
SEIDEL, B.L. - NASA-JPL, PASADENA, CA PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	71
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	74
SEIDELMANN, P.K. - US NAVAL OBSERVATORY, WASHINGTON, DC	

INVESTIGATORS AND EXPERIMENTS	PAGE
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	158
SEILER, W. - MPI-CHEMISTRY, MAINZ, FED REP OF GERMANY OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
SEKIGUCHI, H. - RIKKYO U, TOKYO, JAPAN ENOS-C, LIMB SCANNING IR RADIOMETER (ENOS-C -01).....	111
SELLEN, JR., J.M. - TRW SYSTEMS GROUP, REDONDO BEACH, CA *SPACE SHUTTLE LDEF-A, SPACE PLASMA-HIGH VOLTAGE DRAINAGE (SSLDEF -09).....	144
SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	149
SHACKFORD, R.G. - GEORGIA INST OF TECH, ATLANTA GA SPACE SHUTTLE LDEF-A, EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS (SSLDEF -26).....	148
SHAPIRO, I.I. - MASS INST OF TECH, CAMBRIDGE, MA PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	75
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
SHAPIRO, M.M. - US NAVAL RESEARCH LAB, WASHINGTON, DC *SPACE SHUTTLE LDEF-A, HEAVY IONS IN SPACE (SSLDEF -13).....	144
SHARE, G.H. - US NAVAL RESEARCH LAB, WASHINGTON, DC GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	119
SNM, GAMMA-RAY SPECTROMETER (GRE) (80-014A-07).....	79
SHARP, R.D. - LOCKHEED PALO ALTO, PALO ALTO, CA CCE, PLASMA COMPOSITION (CCE -01).....	102
DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (81-070A-06).....	19
*ISEE 1, ION COMPOSITION (77-102A-12).....	45
SHAW, J.M. - OHIO STATE U, COLUMBUS, OH SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
SHAWHAN, S.D. - U OF IOWA, IOWA CITY, IA *DYNAMICS EXPLORER 1, PLASMA WAVES (81-070A-02).....	19
GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -07).....	115
*OSS-1, PLASMA DIAGNOSTIC PACKAGE (SMOFT-4-01).....	134
*SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	154
SHELLEY, E.G. - LOCKHEED PALO ALTO, PALO ALTO, CA *CCE, PLASMA COMPOSITION (CCE -01).....	102
*DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (81-070A-06).....	19
ISEE 1, ION COMPOSITION (77-102A-12).....	45
SHELUS, P.J. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, ASTROMETRY SCIENCE (LST -09).....	158
SHEMANSKY, D.E. - U OF SOUTHERN CALIF, TUCSON, AZ SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
SHENK, W.E. - NASA-GSFC, GREENBELT, MD GOES 1, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-100A-01).....	29
GOES 3, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (78-062A-01).....	31
GOES 4, VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (80-074A-01).....	32
GOES 5, VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (81-049A-01).....	33
GOES-F, VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-F -01).....	121
SMS 1, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (74-033A-01).....	81
SMS 2, VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-011A-04).....	82
SHEPHERD, G.G. - YORK U, DOWNSVIEW, ONTARIO, CANADA AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11).....	13
*ISIS 2, 6300-A PHOTOMETER (71-024A-12).....	52
SHERIDAN, K.V. - CSIRO, DIV OF RADIOPHYS, EPPING, AUSTRALIA SNM, CORONAGRAPH/POLARIMETER (80-014A-01).....	80
SHIBAZAKI, N. - U OF TOKYO, TOKYO, JAPAN HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
SHRUM, J. - USAF TECH APPL CTR, ALEXANDRIA, VA *DMSP 5D-1/F3, GAMMA-RAY DETECTOR (78-042A-04).....	16
SHULMAN, S.D. - US NAVAL RESEARCH LAB, WASHINGTON, DC *STP P78-1, X-RAY MONITOR (79-017A-06).....	83
SIEFF, A. - NASA-ARC, MOFFETT FIELD, CA *GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	118
SIEGMON, G. - INST P+A NUCLEAR PHYS, KIEL, FED REP OF GERMANY SPACELAB 1, ISOTOPE STACK (SPALAB1-29).....	146
SILBERBERG, R. - US NAVAL RESEARCH LAB, WASHINGTON, DC SPACE SHUTTLE LDEF-A, HEAVY IONS IN SPACE (SSLDEF -13).....	144
SILVAGGIO, P.M. - NASA-ARC, MOFFETT FIELD, CA GALILEO PROBE, NET FLUX RADIOMETER (JOP -04).....	117
SILVERTSON, W.E. - NASA-LARC, HAMPTON, VA OSTA-1, FEATURE IDENTIFICATION AND LOCATION (FILE) (OSTA-1 -03).....	136
SIMNETT, G.M. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	155
SIMON, G.W. - SACRAMENTO PEAK OBS, SUNSPOT, NM	

SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-00).....	154
SIMON, P. - IASB, BRUSSELS, BELGIUM	
*SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	158
SIMPSON, J.A. - U OF CHICAGO, CHICAGO, IL	
*IMP-J, SOLAR FLARE HIGH-Z/LOW-Z AND LOW-Z ISOTOPE (73-078A-07).....	42
*ISPM/ESA, COSMIC RAY AND CHARGED PARTICLE (ISPESA -02).....	125
*PIONEER 6, COSMIC RAY TELESCOPE (65-105A-03).....	67
*PIONEER 10, CHARGED PARTICLE COMPOSITION (72-012A-02).....	72
*PIONEER 11, CHARGED PARTICLE COMPOSITION (73-019A-02).....	74
SINGER, S.F. - U OF VIRGINIA, CHARLOTTESVILLE, VA	
*SPACE SHUTTLE LDEF-A, INTERPLANETARY DUST (SSLDEF -52).....	144
SISCOE, G.L. - U OF CALIF, LA, LOS ANGELES, CA	
ISEE 3, MAGNETIC FIELDS (78-079A-02).....	46
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	77
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
SIVAN, J.P. - CNRS-LAS, MARSEILLE, FRANCE	
SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	147
SJOGREN, W.L. - NASA-JPL, PASADENA, CA	
*VOIR, RADIOMETRY ALTIMETRY GRAVITY (RAGE) (VOIR -03).....	171
SKINNER, G.K. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	155
SLEMP, W.S. - NASA-LARC, HAMPTON, VA	
*SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES(PASSIVE) (SSLDEF -05).....	144
*SPACE SHUTTLE LDEF-A, SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT (SS-DEF -21).....	144
SNIDDY, M. - USAF GEOPHYS LAB, BEDFORD, MA	
ISIS 1, SPHERICAL ELECTROSTATIC ANALYZER (69-089A-02).....	51
SMITH, A.M. - NASA-GSFC, GREENBELT, MD	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
SMITH, B.A. - U OF ARIZONA, TUCSON, AZ	
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	158
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
*VOYAGER 1, IMAGING (77-084A-01).....	93
*VOYAGER 2, IMAGING (77-076A-01).....	95
SMITH, D.F. - HIGH ALTITUDE OBS, BOULDER, CO	
ISEE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	47
SMITH, E.J. - NASA-JPL, PASADENA, CA	
ISEE 1, PLASMA WAVES (77-102A-77).....	44
ISEE 2, PLASMA WAVES (77-102B-05).....	46
*ISEE 3, MAGNETIC FIELDS (78-079A-02).....	48
ISEE 1, PLASMA WAVES (78-079A-07).....	48
*PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	74
SMITH, G.L. - NASA-LARC, HAMPTON, VA	
NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
SMITH, G.M. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	153
SMITH, S.D. - READING U, READING, ENGLAND	
NIMBUS 5, SELECTIVE CHOPPER RADIOMETER (SCR) (72-097A-02).....	68
SMITH, Z.A. - NOAA-SEL, BOULDER, CO	
PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
SMITH, JR., C.F. - NASA-MSFC, HUNTSVILLE, AL	
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	145
SMITHERS, C.W. - U OF SURREY, GUILFORD, SURREY, ENGLAND	
*UOSAT, HIGH FREQUENCY BEACON (UOSAT -04).....	169
SMITHSON, R.C. - LOCKHEED PALO ALTO, PALO ALTO, CA	
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-00).....	154
SMOOT, G.F. - LAWRENCE BERKELEY LAB, BERKELEY, CA	
COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01).....	102
COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02).....	102
*COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	103
SNYDER, A.L. - USAF GEOPHYS LAB, BEDFORD, MA	
*DMSP 5D-1/F4, PASSIVE IONOSPHERIC MONITOR (79-050A-04).....	18
*DMSP 5D-1/F5, PASSIVE IONOSPHERIC MONITOR (DMSP-F5-04).....	104
SODERBLOM, L.A. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
SOMMER, M.K. - MPI-EXTRATERRE PHYS, GARCHING, FED REP OF GERMANY	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
ISPM/ESA, SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST (ISPESA -01).....	124
SOMMER, S.C. - NASA-ARC, MOFFETT FIELD, CA	

GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	118
SONETT, C.P. - U OF ARIZONA, TUCSON, AZ	
*GALILEO ORBITER, INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES*JOVIAN MAGNETOSPHERE (JOPO -24).....	117
*PIONEER 9, TRIAXIAL MAGNETOMETER (68-100A-01).....	69
PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	74
SOUTOUL, A. - CENS, SACLAY, FRANCE	
HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-062A-04).....	36
SPALDING, R.E. - SANDIA LABORATORIES, ALBUQUERQUE, NM	
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75
SPENCER, N.W. - NASA-GSFC, GREENBELT, MD	
*AE-E, NEUTRAL ATMOSPHERE TEMPERATURE (NATE) (75-107A-09).....	15
DYNAMICS EXPLORER 2, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (81-0700-03).....	21
DYNAMICS EXPLORER 2, WIND AND TEMPERATURE SPECTROMETER (81-0700-04).....	22
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	110
PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11).....	76
*SAN MARCO-D/L, WIND AND TEMPERATURE SPECTROMETER (WATS) (SM-0L -04).....	137
*VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
VOIR, VENUS IONOSPHERE DYNAMICS (VOIR -08).....	170
SPENNER, K. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY	
PIONEER VENUS 1, RETARDING POTENTIAL ANALYZER (78-051A-07).....	76
SPITZER, L. - PRINCETON U, PRINCETON, NJ	
*AOO 3, HIGH-RESOLUTION TELESCOPES (72-065A-01).....	66
STAELIN, D.W. - MASS INST OF TECH, CAMBRIDGE, MA	
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMNR) (78-098A-08).....	62
PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	77
VOIR, MICROWAVE ATMOSPHERIC (VOIR -05).....	170
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	94
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	96
STAIR, JR., A.T. - USAF GEOPHYS LAB, BEDFORD, MA	
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	160
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	165
STANLEY, J. - U OF VIRGINIA, CHARLOTTESVILLE, VA	
SPACE SHUTTLE LDEF-A, INTERPLANETARY DUST (SSLDEF -02).....	144
STAUMERT, R. - U OF TUBINGEN, TUBINGEN, FED REP OF GERMANY	
EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	113
STEINBERG, J.L. - PARIS OBSERVATORY, MEUDON, FRANCE	
*ISEE 3, RADIO MAPPING (78-079A-10).....	49
STELZRIED, C.T. - NASA-JPL, PASADENA, CA	
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
STEPHANIDES, C.C. - NASA-GSFC, GREENBELT, MD	
*GEOS 3, LASER TRACKING REFLECTOR (75-027A-04).....	27
STEWART, A.I. - U OF COLORADO, BOULDER, CO	
GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	115
*PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	77
SME, UV OZONE (SME -01).....	130
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
VOIR, AIRGLOW PHOTOMETER (VOIR -04).....	170
STOROV, M. - U OF BERLIN, BERLIN, FED REP OF GERMANY	
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	146
STONE, F.C. - CALIF INST OF TECH, PASADENA, CA	
*HFAO 3, HEAVY NUCLEI (79-082A-03).....	36
*IMP-J, ELECTRONS AND HYDROGEN AND HELIUM ISOTOPIES (73-078A-06).....	42
*ISEE 3, HIGH-ENERGY COSMIC RAYS (78-079A-12).....	49
*ISPM/NASA, COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA) (ISPMASA-03).....	126
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	93
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	96
STONE, N. - NASA-MSC, HUNTSVILLE, AL	
OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOPT-4-01).....	134
STONE, P.M. - MASS INST OF TECH, CAMBRIDGE, MA	
GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	115
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	76
STONE, R.G. - NASA-GSFC, GREENBELT, MD	
HELLOS-A, SOLAR WIND PLASMA WAVE (74-097A-04).....	37
HELLOS-A, FINE FREQUENCY, COARSE FINE RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	37
HELLOS-A, 26.5-KHZ TO 3-MHZ RADIO WAVE (74-097A-06).....	37
*ISEE 3, RADIO MAPPING (78-079A-10).....	49
*ISPM/ESA, UNIFIED RADIO AND PLASMA WAVE (ISPESA -06).....	125
*ISPM/NASA, ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (RAE) (ISPMASA-05).....	126
STOTT, F.D. - CLINICAL RES CENTER, HARROW, MIDDLESEX, ENGLAND	
SPACELAB 1, ELECTRO-PHYSIOLOGICAL TAPE RECORDER (SPALAB1-35).....	148
STONE, L.L. - NOAA-NFSS, SUITLAND, MD	
NIMBUS 6, EARTH RADIATION BUDGET (ERR) (75-052A-05).....	61

NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
STROBEL, D.F. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	92
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	94
STRONG, I.B. - LOS ALAMOS NAT LAB, LOS ALAMOS, NM	
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75
STRONG, K. - U COLLEGE LONDON, LONDON, ENGLAND	
SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	193
STUEMANN, W. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
SPACELAB 1, STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION (SPALAB1-24).....	191
SUGIURA, M. - NASA-USFC, GREENBELT, MD	
DYNAMICS EXPLORER 1, MAGNETIC FIELD OBSERVATIONS (81-070A-01).....	20
DYNAMICS EXPLORER 2, MAGNETIC FIELD OBSERVATIONS (81-070B-01).....	23
UARS-2, MAGNETOMETER EXPERIMENT (UARS-2 -26).....	167
SULLIVAN, J.D. - MASS INST OF TECH, CAMBRIDGE, MA	
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
SULZMAN, F.M. - HARVARD U, CAMBRIDGE, MA	
SPACELAB 1, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS (SPALAB1-15).....	150
SUOMI, V.E. - U OF WISCONSIN, MADISON, WI	
NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	61
VOYAGER 1, IMAGING (77-084A-01).....	93
VOYAGER 2, IMAGING (77-076A-01).....	95
SUSKIND, J. - NASA-GSFC, GREENBELT, MD	
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
SUZUKI, K. - U OF TOKYO, TOKYO, JAPAN	
EXOS-C, ULTRAVIOLET SPECTROMETER (EXOS-C -02).....	112
SWANENBURG, P.M. - U OF LEIDEN, LEIDEN, NETHERLANDS	
EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	113
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
SWANSON, P. - NASA-JPL, PASADENA, CA	
VOIR, MICROWAVE ATMOSPHERIC (VOIR -05).....	170
SWEETING, M.M. - U OF SURREY, GUILFORD, SURREY, ENGLAND	
UOSAT, EARTH IMAGING (UOSAT -02).....	169
UOSAT, MICROWAVE BEACON (UOSAT -05).....	169
SWENSON, G.R. - NASA-MSFC, HUNTSVILLE, AL	
SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	149
SWINDELL, W. - U OF ARIZONA, TUCSON, AZ	
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
SWINNERTON, J.W. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
SYLVAIN, M. - LGE, SAINT-MAUR-DES-FOSSES, FRANCE	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	51
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	53
TAKAGI, M. - NAGOYA U, NAGOYA, JAPAN	
EXOS-C, SOLAR IMAGE-RADIOMETER (EXOS-C -05).....	112
TAKAHASHI, T. - U OF TOKYO, AOBAYAMA, JAPAN	
EXOS-C, PLASMA PROBES (EXOS-C -07).....	112
HINOTORI, PLASMA PROBES (81-017A-06).....	39
TAKAKURA, T. - U OF TOKYO, TOKYO, JAPAN	
HINOTORI, SOLAR FLARE 10-40 KEV X RAYS USING ROTATING MODULATION COLLIMATOR IMAGING (81-017A-01).....	40
TAKEUCHI, M. - INST PHYS & CHEM RES, TOKYO, JAPAN	
HINOTORI, ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR (81-017A-05).....	40
TALLEY, R.L. - SIGMA DATA SERV CORP, SILVER SPRING, MD	
NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	61
TANAKA, K. - U OF TOKYO, TOKYO, JAPAN	
HINOTORI, SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.7-2.0 A RANGE (81-017A-02).....	40
TANAKA, Y. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-B, GAS SCINTILLATION PROPORTIONAL COUNTERS (GSPC) (ASTRO-B-01).....	101
HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
HAKUCHO, DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES (79-014A-02).....	34
HINOTORI, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-20 KEV RANGE (81-017A-03).....	39
TANENBAUM, M.D. - SAO, CAMBRIDGE, MA	
HEAO 2, MONITOR PROPORTIONAL COUNTER (MPC) (78-103A-01).....	35
HEAO 2, HIGH-RESOLUTION IMAGER (HRI) (78-103A-02).....	35
HEAO 2, FOCAL PLANE CRYSTAL SPECTROMETER (FPCS) (78-103A-03).....	35
HEAO 2, IMAGING PROPORTIONAL COUNTER (IPC) (78-103A-04).....	35
TANDBERG-HANSEN, E. - NASA-MSFC, HUNTSVILLE, AL	
SMM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	80

INVESTIGATORS AND EXPERIMENTS

PAGE

TARDELL, T.D. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
TAVASSOLI, M. - SCRIPPS COR FOUNDATION, LA JOLLA, CA SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	149
TAWARA, Y. - NAGOYA U, NAGOYA, JAPAN HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
TAYLOR, W.G. - ESA-ESTEC, NOORDWIJK, NETHERLANDS *EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145
TAYLOR, E.W. - USAF WEAPONS LAB, KIRTLAND AFB, NM *SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS (SSLDEF -16).....	144
TAYLOR, F. - NASA-JPL, PASADENA, CA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	114
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	155
TAYLOR, JR., H.A. - NASA-GSFC, GREENBELT, MD AE-E, BENNETT ION-MASS SPECTROMETER (BIMS) (75-107A-18).....	12
*PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	77
TEEGARDEN, B.J. - NASA-GSFC, GREENBELT, MD HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	39
IMP-J, SOLAR AND COSMIC-RAY PARTICLES (73-078A-09).....	41
ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	43
*ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	49
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	71
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	74
TEITELBAUM, M. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	163
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	168
TENNYSON, R.C. - U OF TORONTO, DOWNSVIEW, ONTARIO, CANADA *SPACE SHUTTLE LDEF-A, PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT (SSLDEF -24).....	145
THEILE, B. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY SPACELAB 1, DC AND LOW FREQUENCY VECTOR MAGNETOMETER (SPALAB1-23).....	158
THEIS, R.F. - NASA-GSFC, GREENBELT, MD AE-E, CYLINDRICAL ELECTROSTATIC PROBE (CEP) (75-107A-01).....	12
DYNAMICS EXPLORER 2, LANGMUIR PROBE (81-070B-09).....	20
VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
VOIR, ELECTRON TEMPERATURE AND DENSITY (VOIR -07).....	170
THOMAS, G.E. - U OF COLORADO, BOULDER, CO GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	115
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	77
SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
THOMAS, R.J. - U OF COLORADO, BOULDER, CO SME, UV OZONE (SME -01).....	138
SME, INFRARED RADIOMETER (4 CHANNELS) (SME -02).....	139
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	139
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	139
SME, SOLAR UV MONITOR (SME -05).....	139
SME, SOLAR PROTON ALARM (SME -06).....	139
VOIR, AIRGLOW PHOTOMETER (VOIR -04).....	170
THOMAS-GORFAS, C. - U OF FRANKFURT, FRANKFURT, FED REP OF GERMANY SPACELAB 1, MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT (SPALAB1-34).....	149
THOMPSON, A. - DUBLIN INST ADV STUDY, DUBLIN, IRELAND SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	143
THOMPSON, D.D. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	118
THORTON, G.R. - OXFORD U, OXFORD, ENGLAND UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
THUILLIER, G. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE *SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	150
*SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	150
*UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	163
*UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	168
TIEZ, J.C. - MARTIN-MARIETTA AEROSP, DENVER, CO OSTA-1, FEATURE IDENTIFICATION AND LOCATION (FILE) (OSTA-1 -03).....	136
TILLMAN, J.E. - U OF WASHINGTON, SEATTLE, WA VIKING 1 LANDER, METEOROLOGY (75-075C-07).....	98
TITLE, A.M. - LOCKHEED PALO ALTO, PALO ALTO, CA *SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
TOLSON, R.M. - NASA-LARC, HAMPTON, VA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	98

INVESTIGATORS AND EXPERIMENTS

PAGE

VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
TOMASKO, M.G. - U OF ARIZONA, TUCSON, AZ	
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
TOOMRE, J. - U OF COLORADO, BOULDER, CO	
SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-00).....	148
TORR, D.G. - U OF UTAH, LOGAN, UT	
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	168
TORR, M.R. - U OF UTAH, LOGAN, UT	
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	150
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	168
TOTH, R. - NASA HEADQUARTERS, WASHINGTON, DC	
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATHOS) (SPALAB3-14).....	155
TRAPTON, L.M. - U OF TEXAS, AUSTIN, AUSTIN, TX	
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	73
ST, HIGH-RESOLUTION SPECTROGRAPH (NRS) (LST -02).....	157
TRAINOR, J.H. - NASA-GSFC, GREENBELT, MD	
HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	39
IMP-J, ENERGETIC ELECTRONS AND PROTONS (73-078A-05).....	42
ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	49
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	71
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	74
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	93
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	96
TRAUB, W.A. - SAO, CAMBRIDGE, MA	
SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
TRAVIS, L. - NASA-GISS, NEW YORK, NY	
GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPD -08).....	115
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	76
TRIOLO, J.J. - NASA-GSFC, GREENBELT, MD	
MOSS-1, CONTAMINATION MONITOR (SHOFT-4-09).....	134
TRISKA, P. - CZECH ACAD OF SCI, PRAGUE, CZECHOSLOVAKIA	
MAGION, ELF AND VLF RECEIVERS (78-099C-01).....	57
MAGION, ENERGETIC PARTICLE DETECTORS (78-099C-02).....	57
TRON, J. - NDRE, KJELLER, NORWAY	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	146
TROY, JR., D.E. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
ISIS 2, RETARDING POTENTIAL ANALYZER (71-024A-08).....	52
TRUMPER, J. - MPI-EXTRATERRE PHYS, GARCHING, FED REP OF GERMANY	
EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	113
TSAO, C.H. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SPACE SHUTTLE LDEF-A, HEAVY IONS IN SPACE (SSLDEF -13).....	144
TSUNEMI, H. - OSAKA U, OSAKA, JAPAN	
ASTRO-B, HADAMARD TRANSFORM TELESCOPE (ASTRO-B-02).....	101
ASTRO-B, ALL SKY X-RAY MONITOR (ASTRO-B-03).....	101
HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
TSURUTANI, D.T. - NASA-JPL, PASADENA, CA	
ISEE 3, MAGNETIC FIELDS (78-079A-02).....	48
TURNER, J. - IONOSPHERIC PHED SERV, SYDNEY, AUSTRALIA	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	51
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	53
TURNER, M. - U OF LEICESTER, LEICESTER, ENGLAND	
EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	113
TURNER, R.E. - NASA-LARC, HAMPTON, VA	
UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-1 -22).....	161
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-2 -22).....	165
TURNER, R.E. - NASA-MSFC, HUNTSVILLE, AL	
PIONEER 10, METEOROID DETECTORS (72-012A-04).....	71
UZZOLINO, A. - U OF CHICAGO, CHICAGO, IL	
PIONEER 10, CHARGED PARTICLE COMPOSITION (72-012A-02).....	72
PIONEER 11, CHARGED PARTICLE COMPOSITION (73-019A-02).....	74
TYLER, G.L. - STANFORD U, PALO ALTO, CA	
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	90
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	91
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
UNKNOWN U OF FLORIDA, GAINESVILLE, FL	
GIOTTO, OPTICAL PROBE (OPE) (GIOTTO -09).....	120
ULMER, M. - NORTHWESTERN U, EVANSTON, IL	
JANNA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	119

INVESTIGATORS AND EXPERIMENTS

PAGE

UMAN, M. - U OF FLORIDA, GAINESVILLE, FL GALILEO PROBE, LIGHTNING (JOP -06).....	117
UNDERHILL, M.J. - U OF SURREY, GUILFORD, SURREY, ENGLAND UOSAT, HIGH FREQUENCY BEACON (UOSAT -04).....	169
UNGSTRUP, E. - DANISH SPACE RES INST, LYNGBY, DENMARK ESA-GEOS 2, MAGNETIC WAVE FIELDS (78-071A-06)..... ESA-GEOS 2, ELECTRIC WAVE FIELDS (78-071A-10).....	24 29
UNKNOWN BALL AEROSPACE SYS DIV, BOULDER, CO GIOTTO, HALLEY NUCLEUS IMAGING (MMC) (GIOTTO -01).....	120
UNKNOWN CNR, SPACE PLASMA LAB, ROME, ITALY GIOTTO, FAST IMPLANTED ION SENSOR (JPA) (GIOTTO -05).....	120
UNKNOWN CNRS-LAS, MARSEILLE, FRANCE GIOTTO, OPTICAL PROBE (OPE) (GIOTTO -09).....	120
UNKNOWN CNRS-LGE, SAINT-MAUR, FRANCE GIOTTO, NEUTRAL MASS SPECTROMETER (NMS) (GIOTTO -02).....	120
UNKNOWN CNRS-LPSP, VERRIERES-LE-BUISSON, FRANCE GIOTTO, HALLEY NUCLEUS IMAGING (MMC) (GIOTTO -01).....	120
UNKNOWN DFVLR, OBERPFAFFENHOFEN, FED REP OF GERMANY GIOTTO, HALLEY NUCLEUS IMAGING (MMC) (GIOTTO -01).....	120
UNKNOWN DUBLIN INST ADV STUDY, DUBLIN, IRELAND GIOTTO, ENERGETIC PARTICLES (EPA) (GIOTTO -10).....	120
UNKNOWN INST D'ASTROPHYSIQUE, LIEGE, BELGIUM GIOTTO, HALLEY NUCLEUS IMAGING (MMC) (GIOTTO -01).....	120
UNKNOWN INST DI ASTRONOMIA, PADOVA, ITALY GIOTTO, HALLEY NUCLEUS IMAGING (MMC) (GIOTTO -01).....	120
UNKNOWN LOCKHEED PALO ALTO, PALO ALTO, CA GIOTTO, ION MASS SPECTROMETER (IMS) (GIOTTO -03).....	120
UNKNOWN MPI-AERONOMY, LINDAU, FED REP OF GERMANY GIOTTO, ELECTRON ESA AND POSITIVE ION CLUSTER COMPOSITION ANALYZER (CPA) (GIOTTO -06).....	121
UNKNOWN MPI-AERONOMY, LINDAU, FED REP OF GERMANY GIOTTO, FAST IMPLANTED ION SENSOR (JPA) (GIOTTO -05)..... GIOTTO, ENERGETIC PARTICLES (EPA) (GIOTTO -10).....	120 120
UNKNOWN MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY GIOTTO, DUST IMPACT DETECTOR (DID) (GIOTTO -08).....	120
UNKNOWN NASA-GSFC, GREENBELT, MD GIOTTO, MAGNETOMETER (MAG) (GIOTTO -07).....	120
UNKNOWN NASA-JPL, PASADENA, CA GIOTTO, ION MASS SPECTROMETER (IMS) (GIOTTO -03).....	120
UNKNOWN U OF BERNE, BERNE, SWITZERLAND GIOTTO, NEUTRAL MASS SPECTROMETER (NMS) (GIOTTO -02).....	120
UNKNOWN U OF BONN, BONN, FED REP OF GERMANY GIOTTO, NEUTRAL MASS SPECTROMETER (NMS) (GIOTTO -02).....	120
UNKNOWN U OF CALIF, BERKELEY, BERKELEY, CA GIOTTO, ELECTRON ESA AND POSITIVE ION CLUSTER COMPOSITION ANALYZER (CPA) (GIOTTO -06).....	121
UNKNOWN U OF ROME, ROME, ITALY GIOTTO, MAGNETOMETER (MAG) (GIOTTO -07).....	120
UNKNOWN U OF TEXAS, DALLAS, DALLAS, TX GIOTTO, NEUTRAL MASS SPECTROMETER (NMS) (GIOTTO -02).....	120
UNWIN, R.S. - DEPT OF SCI+INDUST RES, CHRISTCHURCH, NEW ZEALAND ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01)..... ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	51 53
URBAN, E.W. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	152
VAISBERG, O.L. - IKI, MOSCOW, USSR VENERA 11, SOLAR WIND PLASMA DETECTORS (78-084A-08)..... VENERA 12, SOLAR WIND PLASMA DETECTORS (78-086A-08).....	88 89
VALENICEK, B. - ASTRONOMICAL INST, ONDREJOV, CZECHOSLOVAKIA PROGNOZ 8, SOLAR X-RAY SPECTROMETER (88-103A-01).....	78
VALENZUELA, A. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY IRM, LI AND BA RELEASE MODULE (IRM -01).....	123
VAN ALLEN, J.A. - U OF IOWA, IOWA CITY, IA IMP-J, CHARGED PARTICLE MEASUREMENTS EXPERIMENT (73-078A-08)..... PIONEER 10, JOVIAN CHARGED PARTICLES (72-012A-11)..... PIONEER 11, JOVIAN CHARGED PARTICLES (73-019A-11).....	41 72 74
VAN ALTENA, W.F. - YALE U, NEW HAVEN, CT ST, ASTROMETRY SCIENCE (LST -09).....	158
VAN BECK, M.F. - SPACE RESEARCH LAB, UTRECHT, NETHERLANDS	

SMN, HARD X-RAY IMAGING SPECTROMETER (HXIS) (88-014A-05).....	79
VAN CITTERS, G.W. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	157
VAN DE HULST, H.C. - HUYGENS LAB, LEIDEN, NETHERLANDS *ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	158
VAN DEN NIEUWENHOF, R.M. - U OF UTRECHT, UTRECHT, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08).....	48
VAN DER PIEPER, H. - DFVLR, FRANKFURT, FED REP OF GERMANY OSTA-1, OCEAN COLOR (OCE) (OSTA-1 -05).....	135
VAN GILS, J.N. - U OF UTRECHT, UTRECHT, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08).....	48
VAN HOLLEBEKE, M.A. - U OF MARYLAND, COLLEGE PARK, MD ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	49
VAN HOOSIER, M.E. - US NAVAL RESEARCH LAB, WASHINGTON, DC OSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SHOFT-4-03).....	133
SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	152
SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11).....	152
UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08).....	159
UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -08).....	164
VAN ROOIJEN, J.J. - U OF UTRECHT, UTRECHT, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08).....	48
VANCOUR, R.P. - USAF GEOPHYS LAB, BEDFORD, MA *STP P78-1, HIGH LATITUDE PARTICLE SPECTROMETER (79-017A-05).....	83
VASYLIUNAS, V.M. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY GALILEO ORBITER, PLASMA (JOPO -04).....	114
ISEE 1, HOT PLASMA (77-102A-03).....	43
ISEE 2, HOT PLASMA (77-102B-03).....	46
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	92
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	94
VAUGHAN, JR., O.H. - NASA-MSFC, HUNTSVILLE, AL OSTA-1, NIGHT/DAY OPTICAL SURVEY OF LIGHTING (OSTA-1 -06).....	136
VEDRENNE, G. - CESR, TOULOUSE, FRANCE *VENERA 11, GAMMA-RAY SPECTROMETER (78-084A-01).....	88
*VENERA 12, GAMMA-RAY SPECTROMETER (78-086A-01).....	89
VENABLES, J.D. - MARTIN-MARIETTA LABS, BALTIMORE, MD *SPACE SHUTTLE LDEF-A, RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT (SSLDEF -22).....	145
VENKATAVARADAN, V. - TATA INST OF FUND RES, BOMBAY, INDIA SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	155
VEVERKA, J. - CORNELL U, ITHACA, NY GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	113
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	91
VILLA, G. - U OF MILAN, MILAN, ITALY EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	113
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	145
VITON, M. - CNRS-LAS, MARSEILLE, FRANCE SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	147
VOGT, R.E. - CALIF INST OF TECH, PASADENA, CA HEAO 3, HEAVY NUCLEI (79-082A-03).....	36
IMP-J, ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES (73-078A-06).....	42
ISEE 3, HIGH-ENERGY COSMIC RAYS (78-079A-12).....	49
*VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	93
*VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	96
VOLK, H. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY ESA-GEOS 2, DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION (78-071A-08).....	25
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	43
VOLLAND, H.E. - U OF BONN, BONN, FED REP OF GERMANY ISPM/ESA, RADIO SCIENCE (ISPESA -09).....	124
VON BAUMGARTEN, R. - U OF MAINZ, MAINZ, FED REP OF GERMANY *SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-01).....	151
VON DEN BERG, L. - EG&G INC, GOLETA, CA SPACELAB 3, VAPOR CRYSTAL GROWTH SYSTEM (VCGS) (SPALAB3-02).....	156
VON ROSENGINGE, T.T. - NASA-GSFC, GREENBELT, MD *ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	49
VON ZAHN, U. - U OF BONN, BONN, FED REP OF GERMANY *GALILEO PROBE, HELIUM ABUNDANCE INTERFEROMETER (JOP -01).....	118
VONDERHAAR, T.H. - COLORADO STATE U, FORT COLLINS, CO NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	63
VONNEGUT, B. - STATE U OF NEW YORK, ALBANY, NY *OSTA-1, NIGHT/DAY OPTICAL SURVEY OF LIGHTING (OSTA-1 -06).....	136
VOSS, JR., E.W. - U OF ILLINOIS, URBANA, IL *SPACELAB 1, EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS (SPALAB1-17).....	151

INVESTIGATORS AND EXPERIMENTS

PAGE

WADDINGTON, C.J. - U OF MINNESOTA, MINNEAPOLIS, MN MEAO 3, HEAVY NUCLEI (79-082A-03).....	36
WAGNER, W.J. - HIGH ALTITUDE OBS, BOULDER, CO SMN, CORONAGRAPH/POLARIMETER (80-014A-01).....	80
WALKER, J.C.G. - U OF MICHIGAN, ANN ARBOR, MI AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11)..... SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	13 150
WALLACE, J.M. - U OF WASHINGTON, SEATTLE, WA UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17)..... UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	161 166
WALLIO, H.A. - NASA-LARC, HARTPTON, VA OSTA-1, MEASUREMENT OF AIR POLLUTION FROM SATELLITES (OSTA-1 -04).....	136
WANG, T.G. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13)..... SPACELAB 3, DROP DYNAMICS MODULE (DDM) EXPERIMENTS (SPALAB3-09).....	153 156
WANG, W.-C. - NASA-GISS, NEW YORK, NY GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	115
WARNOCK, J.M. - NOAA, BOULDER, CO ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02)..... ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	50 52
WARNICK, J.W. - RADIOPHYSICS, INC, BOULDER, CO VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10)..... VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	94 96
WATANABE, Y. - U OF TOKYO, TOKYO, JAPAN JIKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	55
WATERS, J.W. - NASA-JPL, PASADENA, CA UARS-1, MICROWAVE LIMB SOUNDER (MLS) (UARS-1 -13)..... UARS-2, MICROWAVE LIMB SOUNDER (MLS) (UARS-2 -13).....	163 168
WEBBER, J.R. - U OF NEW HAMPSHIRE, DURHAM, NH GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03)..... PIONEER 9, COSMIC-RAY TELESCOPE (68-100A-06)..... PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12)..... PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12)..... VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08)..... VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	119 69 71 74 93 96
WEBER, R.R. - NASA-GSFC, GREENBELT, MD HELIOS-A, 26.5-KHZ TO 3-MHZ RADIO WAVE (74-097A-06).....	37
WEIGAND, A.J. - NASA-LERC, CLEVELAND, OH SPACE SHUTTLE LDEF-A, ION BEAM TEXTURED AND COATED SURFACES (SSLDEF -01).....	140
WEINRAUCH, J. - MPI-PHYS ASTROPHYS, GARCHING, FED REP OF GERMANY HELIOS-A, MICROMETEOROID DETECTOR AND ANALYZER (74-097A-12).....	37
WEINBERG, J.L. - U OF FLORIDA, GAINESVILLE, FL OSS-1, CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE (SNOFT-4-06).....	134
WEINSTEIN, O. - NASA-GSFC, GREENBELT, MD LANDSAT 3, RETURN BEAM VIDICON CAMERA (RBV) (78-026A-01)..... LANDSAT-0, THEMATIC MAPPER (LAND-0 -01)..... LANDSAT-1, THEMATIC MAPPER (LAND-E -01).....	57 127 128
WEISS, R. - MASS INST OF TECH, CAMBRIDGE, MA COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (CODE -01)..... COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (CODE -02)..... COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (CODE -03).....	102 102 103
WELCH, D.W. - ROCKWELL INTL CORP, TULSA, OK SPACE SHUTTLE LDEF-A, GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE (SSLDEF -35).....	143
WELLMAN, J.B. - NASA-JPL, PASADENA, CA GALILEO ORBITER, ORBITER IMAGING (JOPO -10)..... VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	113 91
WENZEL, K.P. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08)..... SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	48 143
WEST, R. - U OF COLORADO, BOULDER, CO VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	95
WESTERGARD, N.J. - DANISH SPACE RES INST, LYNGBY, DENMARK MEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	36
WESTPHAL, J.A. - CALIF INST OF TECH, PASADENA, CA ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	150
WEYMAN, R.J. - U OF ARIZONA, TUCSON, AZ ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	157
WHALEN, B.A. - NATL RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (81-078A-06).....	19
WHARTON, L.E. - NASA-GSFC, GREENBELT, MD DYNAMICS EXPLORER 2, WIND AND TEMPERATURE SPECTROMETER (81-0700-04).....	22

VOIR, VENUS THERMOSPHERE DYNAMICS (VOIR -06).....	171
WHATLEY, A. - READING U, READING, ENGLAND SPACE SHUTTLE LDEF-A, HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS (SSLDEF -23).....	144
WHIPPLE, E. - U OF CALIF, SAN DIEGO, LA JOLLA, CA *STP P7B-2, UCSD CHARGED PARTICLE DETECTOR (79-007A-11).....	89
WHITAKER, A.F. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	145
*SPACELAB 1, TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL (SPALAB1-10).....	148
WHITNEY, J.C. - OXFORD U, OXFORD, ENGLAND UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166
WHITTEKER, J.H. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA *ISIS 1, SWEET-FREQUENCY SOUNDER (69-009A-01).....	91
*ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02).....	90
*ISIS 2, SWEET-FREQUENCY SOUNDER (71-024A-01).....	93
*ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	92
WHITTEN, R.C. - NASA-ARC, MOFFETT FIELD, CA PIONEER VENUS 1, RETARDING POTENTIAL ANALYZER (78-051A-07).....	76
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-10).....	77
WIDDERENZ, G.M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	38
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	47
WILCOX, J.M. - STANFORD U, PALO ALTO, CA *ISEE 3, GROUND BASED SOLAR STUDIES (78-079A-13).....	49
WILHEIT, JR., T.T. - NASA-GSFC, GREENBELT, MD *NIMBUS 5, ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) (72-097A-04).....	60
*NIMBUS 6, ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) (75-052A-03).....	62
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMNR) (78-098A-08).....	62
WILHELM, K. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY *SPACELAB 1, STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION (SPALAB1-24).....	191
WILKEN, B. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY CCE, CHARGE-ENERGY-MASS SPECTROMETER(CHEN) (CCE -03).....	101
*ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	25
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
HELIOS-A, ENERGETIC ELECTRON AND PROTON DETECTOR (74-097A-10).....	38
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	47
WILKES, D.R. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (SSLDEF -04).....	145
WILKINSON, D.T. - PRINCETON U, PRINCETON, NJ CODE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (CODE -01).....	102
CODE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (CODE -02).....	102
CODE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (CODE -03).....	103
WILLIAMS, D.J. - NOAA-ERL, BOULDER, CO *GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	117
*GOES 1, ENERGETIC PARTICLE MONITOR (75-100A-02).....	29
*GOES 1, SOLAR X-RAY MONITOR (75-100A-03).....	29
*GOES 1, MAGNETIC FIELD MONITOR (75-100A-04).....	29
*GOES 2, ENERGETIC PARTICLE MONITOR (77-048A-02).....	30
*GOES 2, SOLAR X-RAY MONITOR (77-048A-03).....	30
*GOES 2, MAGNETIC FIELD MONITOR (77-048A-04).....	30
*GOES 3, ENERGETIC PARTICLE MONITOR (78-062A-02).....	31
*GOES 3, SOLAR X-RAY MONITOR (78-062A-03).....	31
*GOES 3, MAGNETIC FIELD MONITOR (78-062A-04).....	31
*GOES 4, ENERGETIC PARTICLE MONITOR (80-074A-02).....	32
*GOES 4, SOLAR X-RAY MONITOR (80-074A-03).....	32
*GOES 4, MAGNETIC FIELD MONITOR (80-074A-04).....	32
*GOES 5, ENERGETIC PARTICLE MONITOR (81-049A-02).....	33
*GOES 5, SOLAR X-RAY MONITOR (81-049A-03).....	34
*GOES 5, MAGNETIC FIELD MONITOR (81-049A-04).....	34
*GOES-F, ENERGETIC PARTICLE MONITOR (GOES-F -02).....	121
*GOES-F, SOLAR X-RAY MONITOR (GOES-F -03).....	122
*GOES-F, MAGNETIC FIELD MONITOR (GOES-F -04).....	122
HELIOS-A, ENERGETIC ELECTRON AND PROTON DETECTOR (74-097A-10).....	38
*IMP-J, ENERGETIC ELECTRONS AND PROTONS (73-078A-05).....	42
*ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	47
*NOAA 6, SPACE ENVIRONMENT MONITOR (79-057A-04).....	65
*NOAA 7, SPACE ENVIRONMENT MONITOR (81-059A-04).....	66
*NOAA-B, SPACE ENVIRONMENT MONITOR (NOAA-B -04).....	129
*NOAA-E, SPACE ENVIRONMENT MONITOR (NOAA-E -04).....	130
*NOAA-F, SPACE ENVIRONMENT MONITOR (NOAA-F -04).....	131
*NOAA-G, SPACE ENVIRONMENT MONITOR (NOAA-G -04).....	132
*SMS 1, ENERGETIC PARTICLE MONITOR (74-033A-02).....	81
*SMS 1, SOLAR X-RAY MONITOR (74-033A-03).....	81
*SMS 1, MAGNETIC FIELD MONITOR (74-033A-04).....	81
*SMS 2, ENERGETIC PARTICLE MONITOR (75-011A-01).....	82
*SMS 2, SOLAR X-RAY MONITOR (75-011A-02).....	82
*SMS 2, MAGNETIC FIELD MONITOR (75-011A-03).....	82
*TIMOS-N, SPACE ENVIRONMENT MONITOR (78-096A-04).....	87
WILLIAMSON, E.J. - OXFORD U, OXFORD, ENGLAND NIMBUS 6, PRESSURE MODULATED RADIOMETER (PMR) (75-052A-09).....	61
NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	62
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	161
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	166

INVESTIGATORS AND EXPERIMENTS -----

PAGE

WILLIAMSON, P.R. - UTAH STATE U, LOGAN, UT OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SMOFT-0-04).....	133
WILLMORE, A.P. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SMR, HARD X-RAY IMAGING SPECTROMETER (HMS) (88-014A-05).....	79
*SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	100
UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	87
WILLS, R.D. - ESA-ESTEC, NOORDWIJK, NETHERLANDS SAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	119
WILLSON, R.C. - NASA-JPL, PASADENA, CA *SMR, ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR (88-014A-05).....	88
*SPACELAB 1, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	101
WILSON, J.W.G. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	100
WILSON, R.G. - NASA-LARC, DENVER, CO OSTA-1, FEATURE IDENTIFICATION AND LOCATION (FILE) (OSTA-1 -03).....	136
WILSON, R.N. - EUROPE SO OBS, SWITZ, GENEVA, SWITZERLAND ST, FAINT-OBJECT CAMERA (FOC) (LST -00).....	100
WINNINGHAM, J.D. - SOUTHWEST RES INST, SAN ANTONIO, TX DYNAMICS EXPLORER 1, HIGH ALTITUDE PLASMA INSTRUMENT (81-078A-05).....	18
*DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INSTRUMENT (81-0700-08).....	23
DYNAMICS EXPLORER 2, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (81-0700-13).....	22
*UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	163
*UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	160
MITTE, M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	30
WOIFF, H.S. - CLINICAL RES CENTER, HARROW, MIDDLESEX, ENGLAND SPACELAB 1, ELECTRO-PHYSIOLOGICAL TAPE RECORDER (SPALAB1-35).....	148
WOLFE, J.M. - NASA-ARC, MOFFETT FIELD, CA HELIOS-A, PLASMA DETECTORS (74-097A-09).....	39
*PIONEER 6, ELECTROSTATIC ANALYZER (65-100A-06).....	68
*PIONEER 9, ELECTROSTATIC ANALYZER (68-100A-02).....	70
*PIONEER 10, PLASMA (72-012A-13).....	72
*PIONEER 11, PLASMA (73-019A-13).....	75
*PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-10).....	77
WOLFSON, C.J. - LOCKHEED PALO ALTO, PALO ALTO, CA SMR, SOFT X-RAY POLYCHROMATOR (XRP) (88-014A-04).....	79
WOO, R. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	113
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	75
WOOD, G.E. - NASA-JPL, PASADENA, CA VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	93
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	96
WOODGATE, D.E. - NASA-GSFC, GREENBELT, MD SMR, ULTRAVIOLET SPECTROMETER AND POLARIMETER (88-014A-02).....	80
WORDEN, S.P. - SACRAMENTO PEAK OBS, SUNSPOT, NH SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	154
WRENN, G.L. - U COLLEGE LONDON, LONDON, ENGLAND ESA-GEOS 2, THERMAL PLASMA FLOW (78-071A-02).....	26
WRIGLEY, R.C. - NASA-ARC, MOFFETT FIELD, CA NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
WUEBBLES, D.J. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	160
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	164
YAMAMOTO, M. - RIKKYO U, TOKYO, JAPAN EXOS-C, LIMB SCANNING IN RADIOMETER (EXOS-C -01).....	111
YANASHITA, K. - OSAKA U, OSAKA, JAPAN ASTRO-B, MAGNANIM TRANSFORM TELESCOPE (ASTRO-B-02).....	101
ASTRO-B, ALL SKY X-RAY MONITOR (ASTRO-B-03).....	101
*ASTRO-B, X-RAY REFLECTING TELESCOPE (ASTRO-B-04).....	101
MAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
VENTSCH, C.S. - BIGELOW LAB OCEAN SCI, WEST BOOTHBAY HARBOR, ME NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	63
YOSHIMORI, M. - RIKKYO U, TOKYO, JAPAN MAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	34
MINOTORI, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.2-9.0 MEV RANGE (81-017A-04).....	39
YOSHINO, T. - U OF ELECTRO-COMMUN, TOKYO, JAPAN EXOS-C, TOPSIDE PLASMA SOUNDER (EXOS-C -06).....	112
YOUNG, D.T. - U OF BERNE, BERNE, SWITZERLAND CEE, PLASMA COMPOSITION (CEE -01).....	102
DYNAMICS EXPLORER 1, HOT PLASMA COMPOSITION (81-070A-06).....	19
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	24
ISEE 1, ION COMPOSITION (77-102A-12).....	45

INVESTIGATORS AND EXPERIMENTS

PAGE

YOUNG, E.R. - U OF MICHIGAN, ANN ARBOR, MI	
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	163
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	166
YOUNG, L.E. - NASA-MSFC, HUNTSVILLE, AL	
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	149
YOUNG, L.R. - MASS INST OF TECH, CAMBRIDGE, MA	
*SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	191
YOUNG, P.S. - MISSISSIPPI STATE U, STATE COLLEGE, MS	
SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	141
YOUNG, R.E. - NASA-ARC, MOFFETT FIELD, CA	
GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	118
UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	161
UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	166
YUNG, V.L. - CALIF INST OF TECH, PASADENA, CA	
GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -06).....	119
UARS-1, GLIMPSE:GLOBAL LIND PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	160
UARS-2, GLIMPSE:GLOBAL LIND PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	164
ZANDER, R. - U OF LIEGE, LIEGE, BELGIUM	
SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) (SPALAB3-14).....	199
ZAVIENYSEFF, V.T. - NASA-ARC, MOFFETT FIELD, CA	
PIONEER 10, PLASMA (72-012A-13).....	72
PIONEER 11, PLASMA (73-019A-13).....	75
ZIMMERMAN, H. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY	
EROSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EROSAT -01).....	113
ZIRIN, H. - CALIF INST OF TECH, PASADENA, CA	
SPACELAB 1, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	151
ZIRKER, J.D. - SACRAMENTO PEAK OBS, SUNSPOT, NM	
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-06).....	154
ZOOK, M.A. - NASA-JSC, HOUSTON, TX	
GALILEO ORBITER, DUST (JOPO -09).....	115
ZUCCARO, D.R. - U OF TEXAS, DALLAS, RICHARDSON, TX	
AL-E, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	13
DYNAMICS EXPLORER 2, ION DRIFT METER (01-0700-06).....	21
DYNAMICS EXPLORER 2, RETARDING POTENTIAL ANALYZER (01-0700-07).....	21
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	161
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	166
ZUREK, R.W. - NASA-JPL, PASADENA, CA	
*UARS-1, RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE (UARS-1 -23).....	164
*UARS-2, RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE (UARS-2 -23).....	169
VOIR, MICROWAVE ATMOSPHERIC (VOIR -05).....	170

APPENDIXES

APPENDIX A - OTHER RELEVANT SPACECRAFT

Spacecraft relevant to the purpose of this report and not included elsewhere are listed in this appendix. Also listed here are missions which were planned to be launched during the reporting period but failed at launch. The spacecraft include those that have been published in earlier reports of this series and now have a status of canceled, failed at launch, or mission being rescoped. Included are essentially dormant spacecraft which are used to provide new science and technology information incorporating ground-based facilities and techniques. In this latter group are the air density studies using air drag effects and ground-based photography, radio beacon receptions, celestial mechanics studies using spacecraft motions and radio transmissions, and laser retroreflector studies. In addition, some spacecraft that were turned off but were still operable in the last report and dropped from this one are listed; it is extremely unlikely these will ever be re-activated. The spacecraft are listed alphabetically by the NSSDC spacecraft common name. Listed with each spacecraft are the sponsoring country and agency, the actual launch date, the NSSDC ID code, and the status. A definition of the terms used in the current status column can be found in Appendix C.

<u>Spacecraft Name</u>	<u>Sponsoring Country and Agency</u>	<u>Launch Date</u>	<u>NSSDC ID</u>	<u>Current Status</u>
AD-A	United States NASA-OSS	12/19/63	63-053A	Air Density Studies
AD-C	United States NASA-OSS	08/08/68	68-066A	Air Density Studies
Apollo 11	United States NASA-OMSF	07/16/69	69-059C	Laser Retroreflector
Apollo 14	United States NASA-OMSF United States NASA-OSS	01/31/71	71-008C	Laser Retroreflector
Apollo 15	United States NASA-OMSF United States NASA-OSS	07/26/71	71-063C	Laser Retroreflector
ATS 5	United States NASA-OSTA	08/12/69	69-069A	Radio Beacon
BE-C	United States NASA-OSS	04/29/65	65-032A	Laser Retroreflector
GEOS 1	United States NASA-OSS	11/06/65	65-089A	Laser Retroreflector
GEOS 2	United States NASA-OSS	01/11/68	68-002A	Laser Retroreflector
ICEX	United States NASA-OSTA	10/00/85	ICEX-A	Rescoped Mission
LAGEOS	United States NASA-OSTA	05/04/76	76-039A	Laser Retroreflector
NOSS	United States NASA-OSTA	00/00/86	NOSS	Canceled Mission
Pioneer 7	United States NASA-OSS	08/17/66	66-075A	Celestial Mechanics
Pioneer 8	United States NASA-OSS	12/13/67	67-123A	Celestial Mechanics

APPENDIX B - SPECIAL INVESTIGATORS

B1. Joint IRAS Science Working Group

The Infrared Astronomy Satellite (IRAS), like IUE, does not have individual principal investigators or team leaders associated with each experiment. Operation of the spacecraft is by the Joint IRAS Science Working Group. Members of this Working Group and their affiliation are listed.

B2. The Caravane Collaboration (COS-B)

The gamma-ray astronomy experiment for COS-B was built, operated, and the data analyzed by a collaboration of six European research groups. Group members that have played a significant role in the implementation of the program are listed with their affiliation.

B3. Individual Galileo Investigations

The Orbiter Imaging and Radio Science investigations include individual studies. The individual investigation name, the objectives, and the investigator and his affiliation are listed.

B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release Module (IRM) Scientific Team

The AMPTE/Charge Composition Explorer/Ion Release Module investigations are conducted by an international scientific team. The members of this scientific team and their affiliation are listed. The Co-Principal Investigators are indicated by an asterisk. This team has rights to the data from each investigation on the two missions while the experiment personnel listed in Section 3.3 have rights only to data from their experiment.

B5. Copernicus Guest Investigators and Investigations

Copernicus (OAO 3) was used by a number of special investigators. The investigation name, the guest investigators, and their affiliation are listed in Appendix B5.

B6. International Solar Polar Mission (ISPM) Theoretical and Interdisciplinary Scientists

The names and affiliation of ISPM theoretical and interdisciplinary scientists are listed.

B7. List of NASA-Selected Magsat Investigators

Investigators who use one or both of the magnetometers on Magsat are listed with their investigations.

B continued

B8. Synthetic Aperture Radar (SAR) Investigators on Venus Orbiting Imaging Radar (VOIR)

The names of the SAR investigators, their affiliations, and the specific areas of their investigation are listed.

B9. NASA-Selected Earth Radiation Budget Experiment (ERBE) Investigators

The ERBE investigators and their affiliations are listed with the subjects of their investigations.

B1. JOINT INFRARED ASTRONOMY SATELLITE (IRAS) SCIENCE WORKING GROUP

<u>Member</u>	<u>Affiliation</u>
Aumann, H. H.	NASA-Jet Propulsion Laboratory
Beintema, D.	University of Groningen, The Netherlands
Borgman, J.	University of Groningen, The Netherlands
Clegg, P.	Queen Mary College, London University, UK
Dejong, T.	University of Leiden, The Netherlands
Gillette, F.	Kitt Peak National Observatory
Habing, A.	University of Leiden, The Netherlands
Hauser, M.	NASA-Goddard Space Flight Center
Houck, J.	Cornell University
Jennings, R.	University College, London University, UK
Low, F.	University of Arizona
Marsden, P.	University of Leeds, UK
Neugebauer, G.	California Institute of Technology (U.S. Principal Scientist, Co-Chairman)
Pottasch, S.	University of Groningen, The Netherlands
Soifer, T.	California Institute of Technology
Van Duinen, R.	University of Groningen, The Netherlands (European Principal Scientist, Co-Chairman)
Walker, R.	NASA-Ames Research Center

B2. THE CARAVANE COLLABORATION (COS-B)

<u>Member</u>	<u>Affiliation</u>
Bennett, K.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Bignami, G. F.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Boella, G.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Buccheri, R.	Università di Palermo, Italy
Burger, J. J.	Scientific Projects Department, ESA-ESTEC Noordwijk, The Netherlands
D'Amico, N.	Università di Palermo, Italy
Hermesen, W.	Huygens Laboratorium Leiden, The Netherlands
Kanbach, G.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Koch, L.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Labeyrie, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Lichti, G. G.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Lust, R.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Masnou, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Mayer-Hasselwander, H. A.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany

B2 concluded

<u>Member</u>	<u>Affiliation</u>
Occhialini, G. P.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Paul, J. A.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Pinkau, K.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Sacco, B.	Università di Palermo, Italy
Scarsi, L.	Università di Palermo, Italy
Swanenburg, B. N.	Huygens Laboratorium Leiden, The Netherlands
Taylor, B. G.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Trendelenburg, E. A.	ESA Headquarters, Paris, France
van de Hulst, H. C.	Huygens Laboratorium Leiden, The Netherlands
Wills, R. D.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands

B3. INDIVIDUAL GALILEO INVESTIGATIONS

IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Auroral Studies	To search for and investigate Jupiter's auroras; to use auroral imaging to obtain information on the configuration and dynamics of the Jovian magnetosphere; to search for luminous phenomena on the dark sides of the Galilean satellites	Clifford D. Anger University of Calgary/ Canada
Structure and Dynamics of the Jovian Atmosphere	To investigate the physical structure and dynamical regimes of the Jovian atmosphere, including cloud motion, heat transfer, cloud composition and scattering properties, and atmospheric wave motions	Michael J. S. Belton Kitt Peak National Observatory
Geological Histories of the Galilean Satellites	To investigate the geologic histories of the Galilean satellites by photogeologic techniques to determine surface morphology and measure local elevations and height contours, and by the preparation of contour maps and geological maps	Michael H. Carr U.S. Geological Survey

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Atmospheric Dynamics and Satellite Histories	To study dynamics of the upper atmosphere of Jupiter by determining cloud motions and evolution; to synthesize Galileo imagery with previous imagery, including ground-based patrol photography; to study surface histories of the Galilean satellites, particularly by crater density and morphology; and to investigate possibilities to make imaging studies of smaller Jovian satellites and of asteroid targets of opportunity	Clark R. Chapman Planetary Science Institute
Geodetics of the Galilean Satellites	To establish a geodetic net on the Galilean satellites and determine their radii, shapes, and rotational poles; to provide satellite control nets for precision cartography	Merton E. Davies Rand Corporation
Geological Exploration of the Galilean Satellites	To investigate the geology of the Galilean satellites using photogeological techniques, with emphasis on cratering, tectonic processes, and the discovery of new geological processes associated with the presence of icy crusts on the satellites	Ronald Greeley Arizona State University

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Dynamical Properties of the Galilean Satellites	To study the internal structure and past history of the Galilean satellites from dynamical studies of shape and rotation; to investigate impact cratering and chronology; to search for previously undiscovered satellites in the Jovian system	Richard Greenberg Planetary Science Institute
Geology of the Galilean Satellites	To investigate surface morphology and infer geologic histories of the Galilean satellites, with emphasis on impact cratering processes and comparative studies with the terrestrial planets	James W. Head, III Brown University
Photogeology of the Galilean Satellites	To investigate the geology of the Galilean satellites with emphasis on impact cratering processes; to develop a multispectral image processing capability and imaging data library in Europe	Gerhard Neukum Munich University, Federal Republic of Germany
Photometry and Imaging of Jupiter and the Galilean Satellites	To investigate the Jovian atmosphere and cloud properties by multispectral photometry and polarimetry; to study surface composition of the Galilean satellites with emphasis on the role of volatiles; to search for auroral emissions from the interaction of satellite atmospheres with the Jovian magnetosphere	Carl B. Pilcher University of Hawaii

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Atmospheric Circulation	To investigate the nature of the thermal and dynamical processes responsible for the atmospheric circulation of Jupiter and the ways that these processes are influenced by the structure of the cloud layers	Gerald Schubert University of California, Los Angeles
Imaging, Spectrophotometry, and Polarimetry of the Galilean Satellites and Jupiter	To investigate the surface morphology and spectrophotometric properties of the Galilean satellites; to identify compositional units of the satellites; to obtain photometry of Jovian belts and zones to investigate cloud properties and energy balance; to investigate possibilities for making photo-polarimetric observations of the smaller Jovian satellites	Joseph Veverka Cornell University
Multispectral Radiometric Imaging of Jupiter and the Galilean Satellites	To participate closely in the development of a multispectral radiometric imaging capability for Galileo, including design of the camera system, its calibration, and development of image processing software; to use these multispectral images to study compositional differences on the surfaces of the Galilean satellites and in the atmosphere of Jupiter	John B. Wellman Jet Propulsion Laboratory

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Celestial Mechanics Measurements of Jupiter and Its Satellites	To use closed-loop radio-metric data from the Galileo orbiter (1) to determine the structure of the gravitational fields of Jupiter and the Galilean satellites; (2) to determine the relativistic time delay during the solar conjunction of Jupiter; and (3) to improve the determination of the orbits of Jupiter and its satellites. Also, to measure the general relativistic redshift in the gravitational field of Jupiter (by using one-way Doppler data)	John D. Anderson Jet Propulsion Laboratory
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to measure the vertical pressure and temperature profiles and atmospheric absorptivity on Jupiter, the Jovian ionospheric structure and dynamics, and the plasma environment of the Galilean satellites; to use phase and intensity scintillation data to study atmospheric turbulence and convection on Jupiter; and to investigate the use of bistatic radar techniques to study the surfaces of the Galilean satellites	Von R. Eshleman Stanford University

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Search for Gravitational Radiation	To use high-precision Doppler monitoring during cruise to conduct a systematic search for very low frequency gravitational waves incident on the solar system, to a level of strain amplitude of about $1.E-10$	Frank B. Estabrook Jet Propulsion Laboratory
Jupiter Radio Astronomy	To study relativistic electrons in the Jovian magnetosphere by measuring the integrated radio flux near 400 MHz (using the Probe relay antenna) over a large range in time and geometry	Eric Gerard Meudon Observatory Paris, France
Microwave Investigation of Jupiter	To use the Probe relay antenna to study the trapped radiation belts of Jupiter and to measure the thermal microwave radiation from the planet with high spatial resolution. Also, to measure the thermal microwave brightness of the Galilean satellites in order to study their surface properties	Samuel Gulkis Jet Propulsion Laboratory

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to study the atmospheres and ionospheres of Jupiter and the Galilean satellites, with emphasis on the neutral atmospheres. For Jupiter, the occultation data determine temperature, pressure, and density profiles down to the 100 mb pressure level. In addition, deviations of the local vertical direction from the predicted value will be determined and used to study zonal wind velocities in the Jovian atmosphere	Arvydas J. Kliore Jet Propulsion Laboratory
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to study the atmospheres and ionospheres of Jupiter and the Galilean satellites, with emphasis on ionospheric measurements. In the ionosphere, the occultation data yield electron number density and plasma scale height profiles	Gunnar Lindal Jet Propulsion Laboratory
Radio Scintillation in the Jovian Atmosphere	To use spacecraft radio scintillations to measure and study turbulence in the Jovian atmosphere, and electron density irregularities, magnetic field direction, and winds in the Jovian ionosphere. Also, where possible, to take similar measurements of the Galilean satellites	Richard Woc Jet Propulsion Laboratory

B4. AMPTE/CHARGE COMPOSITION EXPLORER (CCE)/ION RELEASE
MODULE (IRM) SCIENTIFIC TEAM

<u>Member</u>	<u>Affiliation</u>
Bostrom, C. O. Foppl, H.	Applied Physics Laboratory Max-Planck-Institut fur Extraterrestrische Physik, Garching bei Munchen Federal Republic of Germany
Gloeckler, G. Haerendel, G.	University of Maryland Max-Planck-Institut fur Extraterrestrische Physik, Garching bei Munchen Federal Republic of Germany
Hausler, B.	Max-Planck-Institut fur Extraterrestrische Physik, Garching bei Munchen Federal Republic of Germany
Krimigis, S. M. McEntire, R. W. Paschmann, G.	Applied Physics Laboratory Applied Physics Laboratory Max-Planck-Institut fur Extraterrestrische Physik, Garching bei Munchen Federal Republic of Germany
Shelley, E. G. Valenzuela, A.	Lockheed Palo Alto Research Laboratory Max-Planck-Institut fur Extraterrestrische Physik, Garching bei Munchen Federal Republic of Germany

B5. COPERNICUS GUEST INVESTIGATORS AND INVESTIGATIONS

Study of the Nature of Shells in Be Stars

G. J. Peters, University of Southern California

Study of Circumstellar Shells and Stellar Wind Variability in Be Stars and OB Supergiants

T. P. Snow, University of Colorado

Search for Coronal Features or Circumstellar Cloud Around Sirius B

M. P. Savedoff, University of Rochester

Oscillator Strengths for NI and OI

D. C. Morton, Anglo-Australian Observatory

Ultraviolet and Visible-Wavelength Observations of Spectral Variations in the Mass-Losing Be Star 59 Cygni

T. P. Snow, University of Colorado, et al

A Survey of Interstellar Magnesium in the Directions of A and B Stars Within 100 Parsecs

R. E. Stencel, Y. Kondo, and E. J. Weiler, GSFC and NASA Headquarters

Search for Variability in the X-Ray Emission of the BL LAC Object PKS 0548-322

C. S. Bowyer and K. O. Mason, University of California, Berkeley

Spectral Variability of Accreting Degenerate Dwarfs

C. S. Bowyer, K. O. Mason, D. Lamb, and G. Brandvardi, University of California, Berkeley

Search for Interstellar Boron

Meneguzzi, Centre d'Etudes Nucleaires de Saclay, France

Observation of Hot Companions of Mira Variables

H. M. Johnson, Lockheed Missiles and Space Co.

A Search for Interstellar SiO in Diffuse Clouds

T. P. Snow, University of Colorado

Interstellar Observations of OB Associations with the Copernicus Satellite

J. M. Shull, University of Colorado

Velocity Structure in H₂ Lines Toward π Aquari

T. P. Snow, University of Colorado

Simultaneous In-Eclipse UV Observations of Early-Type Eclipsing Binary Stars

D. D. Meisal and C. Meese, State University of Arts and Science, Geneseo, New York

B5 continued

Doppler Line Profile Measurement of the Jovian Lyman Alpha Emission
S. K. Atreva et al, University of Michigan

Search for Weak Interstellar Lines (O IV, NV, BIII)
D. C. Morton, Anglo-Australian Observatory, Australia

Extension of the D/H Study Toward Hot Stars
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche Scientifique, France

High Velocity Stellar Winds in HI
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche Scientifique, France

High Velocity Gas in the Vicinity of Iota Orionis
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche Scientifique, France

Study of Argon in High Velocity Gas
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche Scientifique, France

Observations of Rotationally Excited HD and Search for Interstellar HCl toward Zeta Ophiuchi
M. Jura, University of California, Los Angeles

Observations of Interstellar C₂
B. Lutz, Lowell Observatory, W. H. Smith, Washington University, and T. P. Snow, University of Colorado

Atmospheric Density Measurements
R. L. White, The Charles Stark Draper Lab., Inc.

Search for OVI in 29 CMA and Study of Far UV, Red-Shifted Lines in Three Stars
D. C. Morton, Anglo-Australian Observatory, Australia

Survey of Interstellar CI and CO
M. A. Jura, University of California, Los Angeles

UV Observations of an Interstellar Cloud with Anomalous Depletions
P. C. Frisch, University of Chicago

Abundance Patterns in HII Regions
J. Silk, University of California, Berkeley, and D. York, Princeton University

Depletion of Fluorine in Interstellar Gas
D. York, Princeton University, and T. P. Snow, University of Colorado

Observation of Lyman Alpha from the Algol Binary System

F. B. Wood and K.-Y. Chen, University of Florida, Gainesville

A Search for Fe III Shell Lines in the Spectra of the Pole-On Be Stars 31 Peg and Omega CMa

G. J. Peters, University of Southern California

Observations of Selected Emission Lines in Beta Lyrae at Various Phases of Its 12.9-Day Period

M. Plavec, University of California, Los Angeles

Scanning of Selected Shell Absorption Lines in Phi Persei at Various Phases of Its 126.6-Day Period

M. Plavec, University of California, Los Angeles

Search for Interstellar H₂O

T. P. Snow, University of Colorado, and W. H. Smith, Washington University

An UV Survey of Be Stars (with Ground-Based Observations)

J. M. Marlborough, University of Western Ontario; A. Slettebak, Ohio Wesleyan University; G. Spear, California State College, Sonoma; G. Peters, University of Southern California; and T. P. Snow, University of Colorado

An Attempt to Detect Forbidden Lines of CIII from Interstellar Gas

L. M. Hobbs, University of Chicago and D. York, Princeton University

Study of Refractory Element Abundances in High Velocity Interstellar Gas

L. M. Hobbs, University of Chicago and D. York, Princeton University

A Search for Variability in the UV Spectrum of Pi Aquari

G. J. Peters, University of Southern California

The Profile and Period of the 4.8-Hour X-Ray Modulation of Cyg. X-3

C. S. Bowyer and K. O. Mason, University of California, Berkeley

Long-Term X-Ray Observations of Systems with Unusual Optics

C. S. Bowyer and P. A. Charles, University of California, Berkeley

**B6. INTERNATIONAL SOLAR POLAR MISSION (ISPM)
THEORETICAL AND INTERDISCIPLINARY SCIENTISTS**

<u>Member</u>	<u>Affiliation</u>
A. Barnes	NASA/Ames Research Center
J. C. Brandt	NASA/Goddard Space Flight Center
L. A. Fisk	University of New Hampshire
J. R. Jokipii	University of Arizona
J. Lemaire	Institute d'Aeronomie Spatiale de Belgique, Belgium
G. Noci	Arcetri Observatory, Italy
C. P. Sonett	University of Arizona

B7. NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Spherical Harmonic Representation of the Main Geomagnetic Field for World Charting and Investigation of Some Fundamental Problems of Physics and Geophysics	To produce an accurate model of the main geomagnetic field, together with reliable estimates of the accuracy of coefficients	David R. Barraclough Institute of Geological Sciences/United Kingdom
Investigation of Antarctic Crust and Upper Mantle Using Magsat and Other Geophysical Data	Using Magsat data, to devise a general framework for the structure of Antarctica into which more specific and local measurements can be integrated	Charles R. Bentley University of Wisconsin
Geomagnetic Field Forecasting and Fluid Dynamics of the Core	To adjust the Gauss coefficients of the Magsat main field model to satisfy dynamic constraints; to use Magsat data to test the ability to forecast the structure of the internal geomagnetic field	Edward R. Benton University of Colorado
Magsat for Geomagnetic Studies in the Indian Region	To prepare a regional geomagnetic reference field and magnetic anomaly maps over the Indian and neighboring regions; to gain a clearer understanding of secondary effect features and the variability of the dawn/dusk field; to study in detail the equatorial electrojet and transient variations	B. N. Bhargava Indian Institute for Geomagnetism/India
Satellite Magnetic and Gravity Investigation of the Eastern Indian Ocean	To produce magnetic anomaly maps of the Indian Ocean; to quantify the comparison between Magsat data and GEOS 3 gravity data; to interpret the magnetic data using ancillary data	Robert F. Brammer The Analytic Sciences Corporation

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Studies of High Latitude Current Systems Using Magsat Vector Data	To understand the physical processes which control high latitude current systems; to improve the confidence level in studies of internal field sources	J. Ronald Burrows National Research Council of Canada/ Canada
Use of Magsat Anomaly Data for Crustal Structure and Mineral Resources in the U.S. Midcontinent	To analyze Magsat anomaly data to synthesize a total geologic model and interpret crustal geology in the midcontinent region; to contribute to the interpretation and calculation of the depth of the Curie Isotherm	Robert S. Carmichael University of Iowa
The Reduction, Verification and Interpretation of Magsat Magnetic Data Over Canada	To select quiet-time data; correct Magsat data for disturbance fields and apply the routines; to compare Magsat and vector airborne data; to combine magnetic anomaly data from Magsat and aircraft; to produce regional interpretations relating to Earth structure	Richard L. Coles Energy, Mines and Resources Canada/Canada
Magsat Data, the Regional Magnetic Field, and the Crustal Structure of Australia and Antarctica	To incorporate Magsat data into regional magnetic field charts to improve their accuracy; to determine if differences exist in temperature-depth curves for different tectonic areas; to study the boundaries between major tectonic blocks, and between continental and Oceanic crust; to determine Curie point depth and crustal magnetization for Antarctica	James C. Dooley Bureau of Mineral Resources/Australia

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Proposal from Japanese National Team for Magsat Project	To analyze the regional geomagnetic field around Japan and Japanese Antarctica; to study the contributions to magnetic variations by electric currents and hydromagnetic waves in and above the ionosphere	Naoshi Fukushima Geophysics Research Laboratory/Japan
Crustal Structures Under the Active Volcanic Areas of Central and Eastern Mediterranean	To calculate the depth of the Curie temperature for the Mediterranean area, and relate to areas of volcanic activity; to investigate the Italian and Tyrrhenian anomaly	Paolo Gasparini Osservatorio Vesuviano/ Italy
Geomagnetic Field Modeling by Optimal Recursive Filtering	To produce a state vector to predict field values for several years beyond the Magsat model; to obtain optimal estimates of field values throughout the 1900-1980 period	Bruce P. Gibbs Business and Technological Systems, Incorporated
Magnetic Anomaly of Bangui	To improve the explanation of the cause of the Bangui anomaly, using Magsat data, other magnetic data, gravity, seismic, and heat flow data	M. R. Godivier Office de la Recherche Scientifique et Technique Outre-Mer/ France
The Mineralogy of Global Magnetic Anomalies	To interpret Magsat data to locate mafic and ultramafic source rocks and lineament expressions of anomalies that can be correlated with crustal or upper mantle depths; to determine mineral stabilities pertinent to magnetic anomalies to determine the magnetic properties of metamorphic rocks	Stephen E. Haggerty University of Massachusetts

B7 continued

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Identification of the Magnetic Signatures of Lithostratigraphic and Structural Elements in the Canadian Shield Using Magnetic Anomalies and Data from Individual Tracks from Magsat	To confirm and extend the model for the crust/mantle magnetization	D. H. Hall University of Manitoba/ Canada
Investigations of Medium Wavelength Magnetic Anomalies in the Eastern Pacific Using Magsat Data	To determine the relationship of magnetic anomalies with surface geological features	Christopher G.A. Harrison University of Miami
An Investigation of Magsat and Complementary Data Emphasizing Precambrian Shields and Adjacent Areas of West Africa and South America	To determine the Magsat magnetic signatures of various tectonic provinces; to determine the geological associations of these signatures; to synthesize Magsat and other data with mineral resources data globally	David A. Hastings Technicolor Graphic Services, Incorporated
Electromagnetic Deep-Probing (100-1000 km) of the Earth's Interior from Artificial Satellites: Constraints on the Regional Emplacement of Crustal Resources	To evaluate the applicability of electromagnetic deep-sounding experiments using natural sources in the magnetosphere	John F. Hermance Brown University

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Application of Magsat to Lithospheric Modeling in South America: Part I-- Processing and Interpretation of Magnetic and Gravity Anomaly Data	Magnetic anomalies will be used to develop lithospheric models to determine the properties of principal tectonic features; magnetic anomalies of South America will be correlated with those of adjacent continental areas to attempt to reconstruct Gondwanaland (see Keller, p. B-22)	William J. Hinze Purdue University
An Investigation of the Crustal Properties of Australia and Surrounding Regions Derived from Interpretation of Magsat Anomaly Field Data	To produce a map of surface magnetization to understand the evolution of the crust and to aid in mineral exploration	B. David Johnson Macquarie University/ Australia
Comparison of Storm-time Changes of Geomagnetic Field at Ground and at Magsat Altitudes	To differentiate between ionospheric and magnetospheric origin for fluctuations in individual storms	R. P. Kane Instituto de Pesquisas Espaciais/Brazil
Analysis of Magsat and Surface Data of the Indian Region	To develop a field model through numerical integration and the non-linear least squares technique; to study geomagnetic anomaly data in conjunction with allied geophysical data for assessment of natural resource and tectonic features	K. L. Khosla Surveyor General/India

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Application of Magsat to Lithospheric Modeling in South America: Part II--Synthesis of Geologic and Seismic Data for Development of Integrated Crustal Models	To provide models of the seismic velocity structure of the lithosphere (see Hinze, p. B-21)	G. R. Keller University of Texas at El Paso
Investigation of the Effects of External Current Systems on the Magsat Data Utilizing Grid Cell Modeling Techniques	To apply a modeling procedure to the vector Magsat data in order to separate the terrestrial component from that due to extraterrestrial sources	David M. Klumpar University of Texas at Dallas
Analysis of Intermediate-Wavelength Magnetic Anomalies Over the Oceans in Magsat and Sea Surface Data	To determine the distribution of intermediate wavelength magnetic anomalies of lithospheric origin in the oceans; the extent to which Magsat describes the distribution, and to determine the cause of these anomalies	John L. LaBrecque Lamont-Doherty Geological Observatory
Magsat Investigations Consortium	To reduce Magsat vector data for a global analytic field model and constant altitude field maps; compare Magsat data to regional studies; study features of the core field; correlate globally and regionally Magsat and gravimetric data	Jean-Louis le Mouel Institut de Physique du Globe de Paris/France

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Magsat Anomaly Field Inversion and Interpretation for the U.S.	To construct a regional crustal temperature/heat flow model based on a developed magnetization model, heat flow/production data, and spectral estimates of the Curie depth	Michael A. Mayhew Business and Technological Systems, Incorporated
Equivalent Source Modeling of the Main Field Using Magsat Data	To model the core field; compute equivalent spherical harmonic coefficients for comparison with other field models; to examine the spectral content of the core field	Michael A. Mayhew Business and Technological Systems, Incorporated
Structure, Composition, and Thermal State of the Crust in Brazil	To construct preliminary crustal models in the Brazilian territory; to point out possible variations in crustal structure among different geological provinces	Igor I. Gil Pacca Universidade de Sao Paulo/Brazil
A Proposal for the Investigation of Magsat and Triad Magnetometer Data to Provide Corrective Information on High-Latitude External Fields	To identify and evaluate high-latitude external fields from the comparison of data acquired by the Magsat and Triad spacecraft which can be used to improve geomagnetic field models	Thomas A. Potemra Johns Hopkins University
Improved Definition of Crustal Magnetic Anomalies in Magsat Data	To develop an improved method for the identification of magnetic anomalies of crustal origin in satellite data by better defining and removing the most persistent external field effects	Richard D. Brown Phoenix Corporation

B7 concluded

NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Study of Enhanced Errors and of the Secular Magnetic Variation Using Magsat Models and Those Derived in POGO Surveys	To estimate the secular variation over the period 1965-80 by removing mathematical instability based upon scalar field intensity alone	David P. Stern NASA/Goddard Space Flight Center
Proposal to Analyze the Magnetic Anomaly Maps from Magsat Over Portions of the Canadian and Other Shields	To examine the expected difference between the Grenville and Superior provinces	David W. Strangway University of Toronto/ Canada
Compatibility Study of the Magsat Data and Aeromagnetic Data in the Eastern Piedmont of the U.S.	To evaluate the compatibility between the Magsat and aeromagnetic data in the Eastern U.S. Piedmont	Ihn Jae Won North Carolina State University

**B3. SYNTHETIC APERTURE RADAR (SAR) INVESTIGATORS ON VENUS
ORBITING IMAGING RADAR (VOIR)**

<u>Investigator</u>	<u>Affiliation</u>	<u>Area of Investigation</u>
Gordon H. Pettengill (Principal Investigator)	Massachusetts Institute of Technology Cambridge, Massachusetts	Planetary Physics
Raymond E. Arvidson	Washington University St. Louis, Missouri	Geology
Victor R. Baker	The University of Texas at Austin Austin, Texas	Geology
Joseph H. Binsack	Massachusetts Institute of Technology Cambridge, Massachusetts	Engineering Development
Donald B. Campbell	National Astronomy and Ionosphere Center Arecibo, Puerto Rico	Planetary Astronomy
Merton E. Davies	The Rand Corporation Santa Monica, California	Geodetic Control for Cartography
Charles Elachi	Jet Propulsion Laboratory Pasadena, California	Radar Science, Surface Radar Geology
John E. Guest	University of London Observatory London, England	Geological Interpretation
James W. Head, III	Brown University Providence, Rhode Island	Geology
William M. Kaula	University of California, Los Angeles Los Angeles, California	Altimetry
Kurt L. Lambeck	The Australian National University Canberra, Australia	Altimetry
Franz W. Leberl	Technical University Graz Graz, Austria	Cartography, with Emphasis on Radar Photogrammetry
H. C. MacDonald	University of Arkansas Fayetteville, Arkansas	Geology
Dan P. McKenzie	Madingley Rise Cambridge, England	Altimetry

B8 continued

<u>Investigator</u>	<u>Affiliation</u>	<u>Area of Investigation</u>
Harold Masursky	U.S. Geological Survey Flagstaff, Arizona	Geology, Cartography
Barry E. Parsons	Massachusetts Institute of Technology Cambridge, Massachusetts	Altimetry
Roger J. Phillips	Lunar and Planetary Institute Houston, Texas	Altimetry
R. Keith Raney	Canada Center for Remote Sensing Ottawa, Canada	Geology
R. Stephen Saunders	Jet Propulsion Laboratory Pasadena, California	Geology
Gerald Schaber	U.S. Geological Survey Flagstaff, Arizona	Geology
Gerald S. Schubert	University of California at Los Angeles Los Angeles, California	Altimetry
Laurence A. Soderblom	U.S. Geological Survey Flagstaff, Arizona	Geology and Image Processing
Sean C. Solomon	Massachusetts Institute of Technology Cambridge, Massachusetts	Geophysics
H. Ray Stanley	NASA Wallops Flight Center Wallops Island, Virginia	Altimetry
Manik Talwani	Columbia University Palisades, New York	Altimetry
G. Leonard Tyler	Stanford University Stanford, California	Surface Morphology Inferred from Radar Scattering
Jeffrey L. Warner	NASA Johnson Space Center Houston, Texas	Geology
John A. Wood	Smithsonian Astrophysical Observatory Cambridge, Massachusetts	Geological and Morphological Interpretation

B9. NASA-SELECTED EARTH RADIATION BUDGET EXPERIMENT (ERBE) INVESTIGATORS

<u>Principal Investigator</u>	<u>Affiliation</u>	<u>Description of Investigations</u>
B. Barkstrom (ERBE Scientist and Science Team Leader)	National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC)	Instrument thermal modeling and cloud variability algorithm development
A. Berroir	Laboratoire de Meteorologie Dynamique, France	Improvement of radiation modelizations in a general circulation model
R. Cess	State University of New York, Stonybrook	Validation of models which predict radiation budget variations and investigate climatic feedback effects.
R. Curran	NASA/Goddard Space Flight Center (GSFC)	The effect of clouds on satellite albedo measurements
C. Duncan	NASA/GSFC	Calibration and evaluations of ERBE Sensors
A. Gruber	National Oceanic and Atmos- pheric Administration (NOAA) National Earth Satellite Service (NESS)	Development of angular models and intercompare ERBE data with atmospheric constituents and operational satellite measurements
E. Harrison	NASA/LaRC	Studies of diurnal variation of cloudiness and Earth radiation budget
D. Hartmann	University of Washington, Seattle	Investigation of the diurnal cycle of radiation budget and the effects of cloudiness on net radiation
F. House	Drexel University, Philadelphia	Application of optimal estimation techniques to data use investigations
F. Huck	NASA/LaRC	Assessment of sensor performance and measurement accuracy

B.9 continued

<u>Principal Investigator</u>	<u>Affiliation</u>	<u>Description of Investigations</u>
G. Hunt	University College London, England	Investigation of regional radiation budgets compared to those from geostationary data and use HALOE and SAGE II to understand effects of other atmospheric constituents
. Kandel	Centre National de la Recherche Scientifique, France	Diurnal variations and the Earth radiation measurements
A. Miller	NOAA/National Meteorological Center (NMC)	The dynamical interpretation of ERBE measurements
V. Ramanathan	National Center for Atmospheric Research	Use of ERBE measurements to validate and improve radiation models and general circulation climate models
E. Raschke	University of Cologne, West Germany	Investigation of surface and regional radiation budgets and improve model parameterizations
G. Smith	NASA/LaRC	Algorithm development and investigation of radiation budget variability
W. Smith	University of Wisconsin, Madison	Investigation of time/space lag of radiation budget compared to other meteorological variables
T. Vonder Haar	Colorado State University, Fort Collins	Algorithm development for averaging ERBE data over time and space and synergistic investigations using SAGE II data

APPENDIX C - DEFINITIONS

Certain words and phrases are used in this report in a precise and specific sense. These terms are defined here to clarify the intended meaning.

Active	A spacecraft/experiment pertinent to this report that has been launched and was reported to NSSDC to have either a "normal" or "partial" status.
Apoapsis	The distance from the center or the altitude from the surface of the reference body to the farthest orbit point. Distance is used in astronomical units (AU) for heliocentric orbits and altitude is used in kilometers (km) for all other orbits.
Approved Mission	A spacecraft mission has been approved and funding is or will be available for it.
Brief Description	A concise summary of the spacecraft mission, specifically outlining overall mission objectives and the scientific studies being performed. Also, a concise summary of experiment purposes and instrument characteristics, emphasizing those relevant to scientific use of the resulting data.
Canceled Mission	A mission was canceled and no funds are expected to become available to carry it out.
Failed Mission	A spacecraft failed to achieve a suitable orbit, or the experiments failed to function after achieving orbit.
Inclination	The angle (in degrees) between the satellite orbital plane and the equatorial plane of the primary gravitational body. For satellites with heliocentric orbits, the ecliptic plane is used in lieu of the equatorial plane.
Inoperable	A spacecraft/experiment can no longer produce useful scientific data because of malfunction or failure of the spacecraft/experiment systems or critical parts thereof; completion of the spacecraft trajectory in which useful measurements could be taken; or discontinuation of network support (tracking, command, and telemetry).
Mission Being Rescoped	A mission has been redefined to an extent that the original mission plan and experiments are no longer valid and a new mission plan and experiments are under study.
Normal	Spacecraft/experiment systems are capable of working so that the data would be suitable for all planned scientific studies for the spacecraft/experiments when they are turned on and the data are recorded.

NSSDC ID Code

An identification code used in the NSSDC information system. In this system, each successfully launched spacecraft/experiment is assigned a code based on the launch sequence of the spacecraft. Subsequent to 1962, this code (e.g., 72-012A for the spacecraft Pioneer 10) corresponds to the COSPAR international designation. The experiment codes are based on the spacecraft code. For example, the experiments carried aboard the spacecraft 73-019A (Pioneer 11) are numbered 73-019A-01, 73-019A-02, etc. Each pre-launch spacecraft and experiment is also assigned an NSSDC ID code based on the name of the spacecraft. For example, the approved NASA launch, Solar Mesosphere Explorer, would be coded SME. The experiments to be carried aboard this spacecraft would be coded SME -01, SME -02, etc. Once a spacecraft is launched, its prelaunch designation is changed to a postlaunch one; e.g., Pioneer G, which was launched April 6, 1973, was given the NSSDC ID code of 73-019A, corresponding to the launch spacecraft common name, Pioneer 11.

Orbit Type

A word or phrase indicating the most important phase of the trajectory of a given spacecraft mission. The orbit type may be geocentric, geocentric commensurate, selenocentric, heliocentric, Hermocentric (Mercury), Cythereanocentric (Venus), Aerocentric (Mars), Zenocentric (Jupiter), Chronocentric (Saturn), lunar lander, Venus lander, Mars lander, Jupiter probe, Venus probe, lunar flyby, Venus flyby, Mars flyby, Mercury flyby, Jupiter flyby, or Saturn flyby.

Partial

Spacecraft/experiment systems are working, but not all are working as well as the design required. If the spacecraft/experiments were turned on and the data recorded, the data would be suitable for only a portion of the planned scientific studies.

Periapsis

The distance from the center or the altitude from the surface of the reference body to the nearest orbit point. Distance is measured in astronomical units (AU) for heliocentric orbits and altitude is measured in kilometers (km) for all other orbits.

Planned

A spacecraft mission was last reported to NSSDC as either "approved" or "proposed." This designation is also used for an experiment that is expected to fly on a planned spacecraft mission.

Proposed Mission

Spacecraft design and experiments have been selected but funding has not been approved.

Standard

Data that can be processed and made available to the experimenters are being acquired at the rate or percentage of coverage required to accomplish the planned studies.

Substandard

Data that can be processed and made available to the experimenters are not being acquired at the rate or percentage of coverage required to continue all planned studies.

Unknown

Information is either unknown or unavailable at NSSDC.

Zero

Applied to data acquisition rates, indicates a spacecraft/experiment has been turned off except for state-of-health measurements and is in a standby condition capable of being returned to its previous status.

APPENDIX D - ABBREVIATIONS AND ACRONYMS

A	angstrom
ABMA	Army Ballistic Missile Agency
AC	alternating current
ACAD	academy
ACIC	Aeronautical Chart and Information Center (now Defense Mapping Agency Aerospace Center)
ACS	attitude control system
AD	Dual Air Density Explorer (satellite, NASA)
A/D	analog to digital
AE	Atmosphere Explorer (satellite, NASA)
AEC	Atomic Energy Commission
AEM	Atmospheric Explorer Mission
AEROPROPUL	aeropropulsion
AEROSAT	Aeronautical Satellite (NASA-ESA)
AEROSP	aerospace
AFB	Air Force Base
AFCRL	Air Force Cambridge Research Laboratories (now US Air Force Geophysics Laboratory)
AFGL	Air Force Geophysics Laboratory
AFO	Announcements of Flight Opportunities
AFSC	Air Force Systems Command
AGC	automatic gain control
AGCY	agency
AH	amp hours
AIMP	Anchored Interplanetary Monitoring Platform (satellite, NASA)
AK	Alaska
AL	Alabama
ALOSYN	Alouette topside sounder synoptic (data)
ALPO	Apollo Lunar Polar Orbiter (satellite, NASA); Association of Lunar and Planetary Observers
ALS	advanced limb scanner
ALSEP	Apollo Lunar Surface Experiments Package (NASA)
ALT	altitude
AM	amplitude modulation
A.M.	ante meridiem
AMP	ampere
AMPS	Atmosphere, Magnetosphere, and Plasmas in Space (satellite, NASA)
AMS	Army Map Service (now Defense Mapping Agency Topographic Center)
AMSAT	Radio Amateur Satellite Corporation
AMU	atomic mass unit; astronaut maneuvering unit
ANIK	Canadian Telecommunications Satellite; also referred to as TELESAT
ANNA	Army, Navy, NASA, Air Force (geodetic satellite)
ANS	Astronomical Netherlands Satellite (The Netherlands-NASA)
AOSO	Advanced Orbiting Solar Observatory
AP	magnetic activity index Ap
APL	Applied Physics Laboratory of Johns Hopkins University
APPL	application
APT	automatic picture transmission
A/R	acquisition/reference

AR	Arkansas
ARC	Ames Research Center (NASA)
ARC MIN	arc minute
ARC S	arc second
ARDC	Air Research and Development Command (now AFSC)
ARPA	Advanced Research Projects Agency
ARSP	Aerospace Research Support Program (USAF)
AS+E	American Science & Engineering, Inc.
ASOS	antimony-sulfide oxy-sulfide
ASTP	Apollo-Soyuz Test Project (USSR-NASA)
ASTROPHYS	astrophysics
AT	atomic
ATCOS	Atmospheric Composition Satellite (NASA)
ATDA	Alternate Target Docking Adapter
ATFE	advanced thermal control flight experiment
ATM	Apollo Telescope Mount; atmosphere
ATMOS	Atmospheric Trace Molecules Observed by Spectroscopy
ATS	Applications Technology Satellite (NASA)
AT+T	American Telephone & Telegraph Corporation
ATU	Adaptive Tracker Unit
AU	astronomical unit
AUST	Australia
AVCS	advanced vidicon camera system
AVG	average
AVHRR	advanced very high resolution radiometer
AWRE	Atomic Weapons Research Establishment (Australia)
AXIS	atmospheric X-ray imaging spectrometer
AZ	Arizona
BAF	barium fluoride
BCD	binary coded decimal
BCG	ballistocardiogram
BE	Beacon Explorer (satellite, NASA); beryllium
BEV	billion electron volts
BIC	barium iodide cloud
BIMS	Bennett ion mass spectrometer
BIOS	Biological Satellite (NASA)
BPI	bits per inch
BPS	bits per second
BSU	basic sounding unit
BTL	Bell Telephone Laboratories
BUV	backscatter ultraviolet
BV	billion volts
B/W	black and white
BWF	Bundesminister fur Wissenschaftliche Forschung (Fed Rep of Germany)
CA	California
CAF	calcium fluoride
CAL	calorie

CAL TECH	California Institute of Technology
CALSPHERE	calibration sphere
CAMEO	Chemically Active Materials Ejected In Orbit (satellite, NASA)
CAN	Canada
CAS	Cooperative Applications Satellite (France-NASA)
CAV	composite analog video
CBE	controlled beam emissions
CCD	charged-coupled device
CCE	Charge Composition Explorer (satellite, NASA)
CCP	charged and current probes
CD	cadmium; crystal detector
CDA	command and data acquisition (station)
CDC	Control Data Corporation
C+LH	control and data handling
CDHP	Command and Data Handling Package
CDS	cadmium sulfide
CEM	channel electron multipliers
CENS	Centre d'Etudes Nucléaires de Saclay (France)
CEP	Cylindrical Electrostatic Probe
CFA	crossed electric and magnetic field analyzer
CHASE	coronal helium abundance Spacelab experiment
CHEM	charge and energy mass spectrometer; chemical
CI	co-investigator
CID	cathode imaging detector
CM	command module; centimeter
CMD	command
CMS	composition measurement system
CN	cellulose nitrate
CNES	Centre National d'Etudes Spatiales (France)
CNET	Centre National d'Etudes des Telecommunications (France)
CNRS	Centre National de la Recherche Scientifique (France)
CO	Colorado; general contact
COBE	Cosmic Background Explorer (satellite, NASA)
COMM	commission
COMSAT	Communications Satellite Corporation
CONIE	Comision Nacional de Investigacion del Espacio (Spain)
CORSA	Cosmic-Ray Satellite (Japan)
COS	Cosmic-Ray Satellite (ESA); cosmic
COSPAR	Committee on Space Research
COUNC	council
CO2	carbon dioxide
CPA	comprehensive particle analysis
CPS	cycles per second
CPT	charged-particle telescope
CPU	central processing unit
CRC	Communications Research Centre (Canada)
CRIS	Centre de Rectification des Images Spatiales
CRIE	cosmic-ray isotope experiment
CRPL	Central Radio Propagation Laboratories (later ITSA; formerly part of ESSA; now NOAA/ERL)
CRREL	Cold Region Research & Engineering Laboratories
CRS	Commission for Space Research (Italy)
CRT	cathode ray tube

CSI	cesium iodide
CSM	command service module
CSTE	cesium telluride
CT	Connecticut
CTR	center
CTS	Canadian Telecommunications Satellite
CULER	cryogenic upper-atmosphere limb emission radiometer
CVF	circular variable filter
CXX	white light coronagraph/X-ray XUV telescope
CZCS	coastal zone ocean color scanner
D	day
DAC	data acquisition camera
DADE	Dual Air Density Explorer (satellite, NASA)
DAN	Danish
DAPP	Defense Acquisition and Processing Program (DOD)
DASA	Defense Atomic Support Agency
DATS	Despun Antenna Test Satellite (DOD)
DB	decibel
DC	direct current; District of Columbia
DCLS	data collection and location system
DCP	data collection platform
DCS	direct couple system; data collection system
DDM	drop dynamics module
DE	Dynamics Explorer (satellite, NASA); Delaware
DEF	defense
DEG	degree
DENPA	Density Phenomena (satellite, Japan)
DEV	development
DFI	development flight instrumentation
DFVLR	Deutsche Forschungs-und Versuchsanstalt fur Luft-und Raumfahrt; (Research Laboratory for Aeronautics and Astronautics, Fed Rep of Germany)
DIAL/MIKA	Diamant Allemande/Mini Kapsel (satellite, Fed Rep of Germany-France)
DIAL/WIKA	Diamant Allemande/Wissenschaftliche Kapsel (satellite, Fed Rep of Germany)
DIAM	diameter
DIAPO	Diapason (satellite, France)
DIRBE	diffuse infrared background experiment
DIT	Drexel Institute of Technology (now Drexel University)
DMA	Defense Mapping Agency
DMAAC	Defense Mapping Agency Aerospace Center
DMATC	Defense Mapping Agency Topographic Center
DME	Direct Measurements Explorer (satellite, NASA)
DMR	differential microwave radiometer
DMSP	Defense Military Satellite Program (DOD)
DMU	IUE data multiplex unit
DOD	Department of Defense
DODGE	Department of Defense Gravity Experiment (satellite, DOD)
DPL	VLF Doppler Propagation

DPU	data processing unit
DRID	direct readout image dissector (camera system)
DRIR	direct readout infrared radiometer
DRTE	Defense Research Telecommunications Establishment (now CRC)
DSAP	Defense System Applications Program (DOD)
DSCS	Defense Satellite Communications System (DOD)
DSIR	Department of Science and Industrial Research (England)
DSN	Deep Space Network
DTM	digital terrain model
DT	deputy team leader
DUS	data utilization stations
DV	digital video
DYN	dynamic
E	energy; east
EASEP	Early Apollo Scientific Experiment Package
EBS	electron beam system
ECG	electrocardiograph
ECS	Experimental Communications Satellite (NASA)
EDS	Environmental Data Service (NOAA)
EEG	electroencephalogram
EFI	electric field instrument
EGO	Eccentric (Orbiting) Geophysical Observatory (satellite, NASA)
EGRS	Engineers Satellite (DOD)
EICS	energetic ion composition spectrometer
EIRP	effective isotropic radiative power
EL	electric (data camera carried on Apollo)
ELDO	European Launch Development Organization (ESA)
ELEC	electric
ELECTR	electronics
ELF	extremely low frequency
ELMS	Earth Limb Measurement Satellite (NASA-USAF)
EM	experiment manager
EME	environmental measurement experiment
EMG	electromyogram
EMR	Electromechanical Research (Company, England)
ENVIRON	environment; environmental
EOF	end of file
EOG	electro-oculogram
EOGO	Eccentric Orbiting Geophysical Observatory (satellite, NASA)
EOS	Earth Observation Satellite (NASA)
EPE	Energetic Particle Explorer (satellite, NASA)
E/Q	energy per unit charge
ERB	Earth radiation budget (experiment)
ERBI	Earth radiation budget instrument
ERBS	Earth Radiation Budget Satellite (NASA)
ERBSS	Earth Radiation Budget Satellite system
ERDC	Earth Resources Data Center
ERGS	Earth Geodetic Satellite (USAF)
ERL	Environmental Research Laboratory (NOAA)
EROS	Earth Resources Observation Service
ERS	Environmental Research Satellite (USAF)

ERT	extended range telescope
ERTS	Earth Resources Technology Satellite (NASA)
ES	experiment scientist
ESA	European Space Agency; electrostatic analyzer
ESA-GEOS	Geostationary Earth-Orbiting Satellite (ESA)
ESM	equipment support module
ESMR	electrically scanning microwave radiometer
ESOC	European Space Operations Centre (ESA)
ESP	energy spectrum of particles
ESRO	European Space Research Organization (now ESA)
ESSA	Environmental Science Services Administration (now NOAA)
ESTABL	establishment
ESTEC	European Space Technology Center (ESA)
ETR	Eastern Test Range (also referred to as Cape Canaveral)
ETS	Engineering Test Satellite
EU	europium
EUV	extreme ultraviolet
EUVE	Extreme Ultraviolet Explorer (satellite, NASA)
EUVS	extreme ultraviolet spectrophotometer
EV	electron volt
EVA	extravehicular activity
EVM	Earth-viewing (equipment) module
EXOS	Exospheric Satellite (Japan,
EXOSAT	European X-ray Observation Satellite (ESA)
EXTRATERR	extraterrestrial

FARO	Flare-Activated Radiobiological Observatory (satellite, DOD)
FAUST	far ultraviolet space telescope
FE	iron
FES	fluid experiment systems
FGS	fine guide system
FIRAS	far infrared absolute spectrophotometer
FL	Florida
FLT-SAT	Fleet Satellite (USN)
FM	frequency modulation
FMDM	flex multiplexer/demultiplexer
FMRT	final meteorological radiation tape
FOC	faint object camera
FOF2	frequency of F2
FOS	faint object spectrograph
FOUND	foundation
FOV	field of view
FPCS	focal plane crystal spectrometer
FPEG	fast pulse electron gun
FPI	Fabry-Perot interferometer
FPR	flat plate radiometer
FR	French Research (satellite, France)
FRG	Flight Research Center (NASA)
FRG	Federal Republic of Germany
FS	frequency scatterometer
FSC	FLTSATCOM (satellite, USN-USAF)

FSK
FWHM
FWS

frequency; shift key
full width at half maximum
filter wedge spectrometer

G Earth gravity; geometry factor; gram
GA Georgia
GAC global area coverage
GARP Global Atmospheric Research Program
GASTE Gravity and Atmospheric and Solid Tides Experiment
GCA Geophysics Corporation of America
GE General Electric (Company)
.GE. greater than or equal to
GEMS Geostationary European Meteorological Satellite (ESA)
GEOPIYS geophysical
GEOS Geodetic Earth-Orbiting Satellite (NASA); Geostationary Earth-Orbiting Satellite (ESA)
GES FUR Gesellschaft fur Weltraumforschung (Center for Space Research, Fed Rep of Germany)
WELTRAUM-
FORSCH
G.E.T. ground elapsed time
GEV giga electron volts (10^9 ev)
GEX gas exchange
GFFC geophysical fluid flow cell
GGSE gravity gradient stabilization experiment
GHZ gigahertz
GI guest investigator
GISS Goddard Institute for Space Studies (NASA)
GLIMPSE global limb photometric scanning experiment
GM Geiger-Mueller
GMS Geostationary Meteorological Satellite (Japan)
GMT Greenwich mean time
GOES Geosynchronous Operational Environmental Satellite (NASA-NOAA; also called SMS)
GP Gravitational Redshift Space Probe (NASA)
GPS global positioning system
GRARR Goddard Range and Range Rate
GRAVR Gravitational Redshift Space Probe (NASA)
GRE ground reconstruction equipment; ground reconstruction electronics
GREB Galactic Radiation Experiment Background (satellite, USN)
GRI Groupe de Recherche Ionospherique (France)
GRO Gamma-Ray Observatory
GROC Netherlands Committee for Geophysics and Space Research
GRS German Research Satellite (NASA-Fed Rep of Germany)
GSD Grid Sphere Drag (satellite, DOD)
GSE geocentric solar ecliptic (coordinate system); ground support equipment
GSFC Goddard Space Flight Center (NASA)
GSM geocentric solar magnetospheric (coordinate system)
GSPC gas scintillation proportional counter
.GT. greater than

GUGMS	Glavnoye Upravleniye Gidrometeorologicheskoi Sluzhby (Main Administration of the Hydrometeorological Service, USSR)
GV	gigavolt
GVHRR	geosynchronous very high resolution radiometer
H	hour; hydrogen
HAC	half-angle collimator
HALOE	halogen occultation experiment
HAO	High Altitude Observatory
HAPI	high-altitude plasma instrument
HCMM	Heat Capacity Mapping Mission (satellite, NASA)
HCMR	heat capacity mapping radiometer
HCO	Harvard College Observatory
HDRSS	high data rate storage system
HE	helium
HFAO	High-Energy Astrophysical Observatory (satellite, NASA)
HEOS	High-Eccentricity Earth-Orbiting Satellite (ESA)
HEP	high-energy protons
HEPS	high-energy particle spectrometer
HEPAT	high-energy proton alpha telescope
HET	health, education, telecommunications; high-energy telescope
HETS	high-energy telescope system
HEW	US Dept. of Health, Education and Welfare (now US Dept. of Education)
HF	high frequency
HFE	heat-flow experiment; heat-flow electronics
HG	mercury
HGI2	mercuric iodide
HI	Hawaii
HRDI	high-resolution Doppler imager
H2O	water
HOLE	high ionospheric depletion region
HR	high resolution
HRDI	high-resolution Doppler image
HRI	high-resolution imager
HRIR	high-resolution infrared radiometer
HRIRS	high-resolution infrared radiometer sounder
HRPT	high-resolution picture transmission
HRS	high-resolution spectrograph
HRTS	high-resolution telescope and spectrograph
H.S.	high school
HSP	high-speed photometer
HXIS	hard X-ray imaging spectrometer
HXRBS	hard X-ray burst spectrometer
HYDROMET	hydrometeorological
HZ	hertz (cycles per second)
HZE	high-energy particle
IA	instrument assembly; Iowa
IAP	Institute of Atmospheric Physics (USSR)
IBM	International Business Machines (Corporation)
ICBM	intercontinental ballistic missile

ICE	ion convection electrodynamics
ICEX	ice and climate experiment
ICSU	International Council of Scientific Unions
ID	identification; Idaho
IDC	image dissector camera
IDCS	image dissector camera system
IDCSP	Initial (or Interim) Defense Communication Satellite Program (or Project) (DOD)
IDM	ion drift meter
IDSCS	Initial Defense Satellite Communication system (DOD)
IDT	instrument definition team
IE	Ionospheric Explorer (satellite, NASA-NBS)
IEAS	ice evaluation altimeter system
IECM	induced environment contamination monitor
IEF	impedance & electric field
IFOV	instrument field of view
IGN	Institut Geographique National
IGRF	International Geomagnetic Reference Field
IGY	International Geophysical Year
IKI	Institute for Space Research (USSR)
IL	Illinois
IME	International Magnetospheric Explorer (satellite, NASA-ESA)
IMP	Interplanetary Monitoring Platform (satellite, NASA)
IMS	International Magnetospheric Study
IN	Indiana
IN.	inch
INDASAT	Indian Scientific Satellite (ISRO-USSR)
INOP	inoperable
INSAT	Indian National Satellite (ISRO-USSR)
INSB	indium/antimony
INST	institute
INTA	Instituto Nacional de Tecnica Aeroespacial (Spain); the National Institute of Aerospace Science
INTASAT	satellite (INTA, Spain)
INTELSAT	International Telecommunications Satellite (NASA-COMSAT)
ION COMP	ionospheric composition
IPA	Institute for Physics of the Atmosphere (SAS)
IPC	imaging proportional counter
IPP	imaging photopolarimeter
IPS	instrument pointing system
IQSY	International Quiet Sun Year
IR	infrared
IRAS	Infrared Astronomy Satellite (The Netherlands-NASA-UK)
IRBM	intermediate range ballistic missile
IRIG	Inter-Range Instrumentation Group
IRIS	infrared-interferometer spectrometer; International Investigation Radiation Satellite (NASA-ESA)
IRLS	interrogation, recording, and location system
IRM	Ion Release Module (satellite, NASA)
IRR	infrared radiometry
IRTM	infrared thermal mapping
INTRN	infrared transmission
ISAMS	improved stratospheric & mesospheric sounder

ISAS	Institute of Space & Aeronautical Science (Japan)
ISEE	International Sun-Earth Explorer (satellite, NASA-ESA)
ISIS	International Satellite for Ionospheric Studies (NASA-Canada)
ISPM	International Solar Polar Mission (ESA)
ISRO	Indian Space Research Organization
ISS	Ionospheric Sounding Satellite (Japan)
ITCZ	intertropical convergence zone
ITE	intersite transportation equipment
ITOS	Improved TIROS Operational Satellite (NOAA)
ITPR	infrared temperature profile radiometer
ITR	incremental tape recorder
ITSA	Institute for Telecommunication of Sciences and Aeronomy (formerly a subdivision of ESSA; now NOAA-ERL)
IU	instrument unit
IUE	International Ultraviolet Explorer (satellite, NASA-UK-ESA)
IUS	intermediate upper stage
IUWDS	International URSIGRAM and World Days Service
IVI	ion velocity instrument
IZMIRAN	Institute of Terrestrial Magnetism and Aeronomy of the Academy of Sciences (USSR)
JHU	Johns Hopkins University
JOP	Jupiter Orbiter Probe (Galileo Probe)
JPL	Jet Propulsion Laboratory (NASA)
JSC	Johnson Space Center (NASA)
K	Kelvin
KBS	kilobits per second
KEV	kiloelectron volt
KG	kilogram
KHZ	kilohertz
KM	kilometer
KP	magnetic activity index Kp
KPNO	Kitt Peak National Observatory
KS	Kansas
KSC	Kennedy Space Center (NASA)
KY	Kentucky
LA	Los Angeles; Louisiana
LAB	laboratory
LAC	local area coverage
LACATE	lower atmosphere composition and temperature
LAGEOS	Laser Geodetic Earth-Orbiting Satellite (NASA)
LAMMR	large antenna multifrequency microwave radiometer
LANG	Langmuir probe instrument
LAPI	low-altitude plasma instrument
LARC	Langley Research Center (NASA)
LAS	Large Astronomical Satellite (ESA)
LASL	Los Alamos Scientific Laboratory

LCS	Lincoln Calibration Sphere
LDEF	long-duration exposure facility
.LE.	less than or equal to
LED	light-emitting diode
LEE	low-energy electron
LEM	lunar excursion module
LEMMS	low-energy magnetospheric measurement system
LEPAT	low-energy proton alpha telescope
LEPEDEA	low-energy proton and electron differential energy analyzer
LERC	Lewis Research Center (NASA)
LES	Lincoln Experimental Satellite (DOD)
LET	low-energy telescope
LETS	low-energy telescope system
LF	light fine; low frequency
LI	lithium
LIF	lithium fluoride
LL	Lincoln Laboratory (MIT)
LM	lunar module
LMD	Laboratory of Meteorological Dynamics
LOFTI	Low-Frequency Trans-Ionospheric (satellite, USN-SRL)
LOGACS	Low-G Accelerometer Calibration System (USAF)
LP	Langmuir probe
IPSP	Laboratoire de Physique Stellaire et Planetaire (CNRS)
LR	labeled release; low resolution
LRIR	limb radiance inversion radiometer; low-resolution infrared radiometer
LRL	Lunar Receiving Laboratory (JSC)
LRV	lunar roving vehicle
LS	light smoothed
LST	Large Space Telescope (satellite, NASA; now called Space Telescope)
.LT.	less than
LTV	Ling-Temco-Vought (Company)
M	meter; milli- (prefix)
MA	Mercury Atlas; Massachusetts
MAG	magnetic field
MAG-A	magnetometer A
MAG-B	magnetometer B
MAPS	measurement of air pollution from satellite
MARENTS	Modified Advanced Research Environmental Test Satellite (USAF)
MAS	Ministry of Aviation Supply (UK)
MASC	magnetic attitude spin coil
MATER	material
MAWD	Mars atmosphere water detection
MB	millibar
MC	megacycle
MCC	Mission Control Center
MD	Maryland
ME	Maine
M/E	mass to charge ratio

MED	medicine; medical
MEPA	medium-energy particle analyzer
MEPS	medium-energy particle spectrometer
MESA	miniature electrostatic accelerometer
METEC	Meteoroid Technology (satellite, NASA)
METEOSAT	Meteorological Satellite (ESA)
MEV	million electron volts
MG	magnesium; milligram
MGF	fluxgate magnetometer
MHZ	megahertz
MI	Michigan
MIDAS	Missile Defense Alarm System (USAF)
MIN	minute
MIT	Massachusetts Institute of Technology
MJS	Mariner Jupiter/Saturn (spacecraft, NASA)
MLS	microwave limb sounder
MM	millimeter
MMS	multimission modular spacecraft
MMW	millimeter wave
MN	Minnesota
MO	month; Missouri
MOL	Manned Orbiting Laboratory (satellite, DOD)
M-P	minus-plus
MPC	monitor proportional counter
MPD	magneto-plasma dynamic
MPI	Max-Planck-Institute (Fed Rep of Germany)
MR	medium resolution
MRIR	medium-resolution infrared radiometer
MRSE	microwave remote sensing experiment
MS	microsecond; millisecond; Mississippi
MSC	Manned Spacecraft Center (now Johnson Space Center)
MSFC	Marshall Space Flight Center (NASA)
MSIS	mass spectrometer - incoherent scatter (model)
MSN	mission
MSS	Magnetic Storm Satellite (NASA-AFCRL); multispectral scanner
MSSCC	multicolor spin-scan cloudcover camera
MT	Montana
MTS	Meteoroid Technology Satellite (NASA)
MUSE	monitor of ultraviolet solar energy
MV	millivolts (10^{-3} volts)
MW	milliwatt
N	nucleon; north
NA	not applicable; Nora Alice (satellite, DOD)
NACE	neutral atmosphere composition experiment
NACS	neutral atmosphere composition spectrometer
NADUC	Nimbus/ATS Data Utilization Center
NASA	National Aeronautics and Space Administration (Washington, DC, Headquarters)
NASC	National Aeronautics and Space Council
NASDA	National Space Development Agency (Japan)

NATE	neutral atmosphere temperature experiment
NATL	national
NATO	North Atlantic Treaty Organization
NBS	National Bureau of Standards
NC	North Carolina
NCAR	National Center for Atmospheric Research
NCC	National Climatic Center (NOAA)
ND	North Dakota
NDRE	Norwegian Defense Research Establishment
NE	electron density (concentration); Nebraska
NEMS	Nimbus-E microwave spectrometer; Near-Earth Magnetospheric Satellite (ESA)
NESC	National Environmental Satellite Center (now NESS)
NESS	National Environmental Satellite Service (NOAA)
NGM	direct measurement of interstellar gas using HE as tracer
NGSP	National Geodetic Satellite Program
NH	New Hampshire
NHC	National Hurricane Center
NI	ion density (concentration)
NIH	National Institutes of Health
NIMS	near infrared mapping spectrometer
NJ	New Jersey
NM	nanometer; New Mexico
NMC	National Meteorological Center
NMRT	Nimbus meteorological radiation tape
NNN	no national name
NNSS	Navy Navigational Satellite System
NO.	number
NOAA	National Oceanic and Atmospheric Administration (formerly ESSA)
NOESS	National Operational Environmental Satellite Subsystem
NOMSS	National Operational Meteorological Satellite System
NORAD	North American Air Defense Command
NORW	Norwegian
NOS	National Ocean Survey (NOAA)
NOSS	National Oceanic Satellite System
NOTS	Naval Ordnance Test Station
NPW	natural plasma wave
NRC	National Research Council
NRL	Naval Research Laboratory
NSA	National Security Agency
NSF	National Science Foundation
NSSDC	National Space Science Data Center
NT	nanotesla
NUCL	nuclear
NWL	Naval Weapons Laboratory
NWRC	National Weather Records Center (presently NCC)
NV	Nevada
NY	New York
OA	Office of Applications (NASA)
OAQ	Orbiting Astronomical Observatory (satellite, NASA)

OAPS	orbit adjust propulsion system
OAR	Office of Aerospace Research (USAF-AFSC)
OART	Office of Advanced Research and Technology (NASA)
OAST	Office of Aeronautics and Space Technology (NASA)
OBS	observatory
O+C	operations and checkout
OCC	OPLE Command Center
OFO	Orbiting Frog Otolith (NASA experimental spacecraft)
OFT	orbital flight test
OGO	Orbiting Geophysical Observatory (satellite, NASA)
OGPC	orbiter general purpose computer
OH	Ohio
OI	other investigator
OIB	orbiter interface box
OK	Oklahoma
OLS	operational linescan system
OMNI	low-resolution omnidirectional radiometer (on Explorer 7)
OMSF	Office of Manned Space Flight (NASA)
ONERA	Office National d'Etudes et de Recherches Aerospatiales
ONR	Office of Naval Research
OOI	orbiter operational instrumentation
OPEP	orbital-plane experiment package
OPF	Orbiter Processing Facility
OPLE	Omega position and location experiment
OP OFF	operational off
OR	Oregon
ORBIS	Orbiting Radio Beacon Ionospheric Satellite (NASA)
ORS	Octahedral Research Satellite (NASA); Orbiting Research Satellite (DOD)
OSCAR	Orbiting Satellite Carrying Amateur Radio
OSO	Orbiting Solar Observatory (satellite, NASA)
OSS	Office of Space Science (NASA); open source spectrometer
OSSA	Office of Space Science and Applications (NASA; now two separate offices)
OSTA	Office of Space and Terrestrial Applications
OT	Operational TIROS (satellite, NASA)
OTDA	Office of Tracking and Data Acquisition (NASA)
OV	Orbiting Vehicle (satellite, USAF)
OVT	organic vapor trap
PA	Pennsylvania
PAC	Packaged Attitude Control (satellite, NASA)
PAET	Planetary Atmosphere Experiment Test
PAGEOS	Passive Geodetic Earth-Orbiting Satellite (NASA)
PAM	pulse amplitude modulation
PC	proportional counter
PCB	power control box
PCM	pulse coded modulation
PD	project director
PDP	plasma diagnostic package; passive dosimeter packet
PE	Planetary Explorer

PEA	planar electrostatic analyzer
PEM	particle environment monitor
PEP	platform electronic package
PES	photoelectron spectrometer
PFM	pulse frequency modulation
PHA	pulse height analyzer
PHASR	Personnel Hazards Associated with Space Radiation (satellite, USAF)
PHYS	physics
PI	principal investigator
PIBS	positive ion beam system
PICNO	picture number
PIMR	polar ice mapping radiometer
PIP	Payload Integration Plan
PIXEL	picture element
PL	prelaunch
PLACE	position location and aircraft communication experiment
PM	pulse modulation; photomultiplier
P.M.	post meridian
PMEL	Pacific Marine Environmental Laboratory (NOAA)
PMP	precision mounting platform
PMR	pressure modulation radiometer; Pacific Missile Range
PMT	photomultiplier tube
P-N	positive-negative (junction)
POCC	OFT Payloads Operations Control Center
POD	proton omnidirectional detector
POZO	Polar Orbiting Geophysical Observatory (satellite, NASA)
PIR	photopolarimeter radiometer
PPS	pulses per second
PR	pyrolytic release
PROT	protection
PS	picoseconds; pressure sensor
PSA	pressure sensor A
PSB	pressure sensor B
PSE	passive seismic experiment
PTL	Photographic Technology Laboratory (JSC)
PWI	plasma wave instrument

Q	charge
QOMAC	quarter-orbit magnetic attitude control (system)

RA	Ranger (spacecraft, NASA)
RAD	radium; radiation
RADCAT	Radar Calibration Target (satellite, ARPA)
RADOSE	Radiation Dosimeter (satellite, DOD)
RAE	Radio Astronomy Explorer (satellite, NASA); electromagnetic survey & unified radio and plasma wave
RAGE	Radiometry Altimetry Gravity Experiment
RAHF	Research Animal Holding Facility
RAM	random access memory (system)
RANICON	resistor anode image converter

RBV	return beam vidicon (camera)
RC	resistance capacitor
RCA	Radio Corporation of America
RCE	reaction control equipment
R+D	research and development
REP	republic
RES	research
REXS	Radio Exploration Satellite (Japan)
RF	radio frequency
RFI	radio frequency interference
RHU	radioscope heater units
RI	Rhode Island
RIMS	retarding ion mass spectrometer
RM	Radiation Meteoroid (satellite, NASA); Radiometric Measurement (satellite, DOD)
RMS	root mean square; Radiation Meteoroid Satellite (NASA); Radiometric Measurement Satellite (DOD); remote manipulator system
RPA	retarding potential analyzer
RPM	revolutions per minute
RPQ	retarding potential quadrupole
RPS	revolutions per second
RRL	Radio Research Laboratories (Japan)
RSRS	Radio and Space Research Station (England)
RTD	Research Technology Division (USAF)
RTG	radioisotope thermoelectric generator
RTTS	real-time transmission system

S	second; south
SAA	South Atlantic Anomaly
SACU	synchronization and control unit
SAGE	stratospheric aerosol and gas experiment
SAI	spin-scan auroral imager
SAM	stratospheric aerosol measurement
SAMIR	satellite microwave radiometer
SAMOS	Satellite Mission Observation (satellite, USAF)
SAMS	stratospheric and mesospheric sounder
SAMSO	Space and Missile Systems Organization (USAF)
SAO	Smithsonian Astrophysical Observatory
SAPPSAC	spacecraft attitude precision pointing and slewing adaptive control
SAR	synthetic aperture radar
SAS	Small Astronomy Satellite (NASA); Soviet Academy of Sciences
SATAR	Satellite for Aerospace Research (NASA)
SATELL	satellite
SATS	Satellite Antenna Test System (NASA)
SBRC	Santa Barbara Research Center
SBUV/TOMS	Solar Backscatter Ultraviolet/Total Ozone Mapping System
SC	project scientist; spark chamber; South Carolina
S/C	spacecraft
SCAMS	scanning microwave spectrometer
SCAT	scattometer

SCATHA	spacecraft charging at high altitudes
SCEL	Signal Corps Engineering Laboratories
SCH	school
SCI	science
SCMR	surface composition mapping radiometer
SCORE	Signal Communication by Orbiting Relay Equipment (satellite, DOD)
SCR	selective chopper radiometer
SCS	selective combined plasma spectrometer
SD	San Diego; South Dakota
SDPF	Sensor Data Processing Facility
SE	Solar Explorer (satellite, NASA)
SEA	spherical electrostatic analyzer
SEASAT	Ocean Dynamic Satellite (NASA)
SEC	secondary electron conduction (vidicon tube)
SECOR	Sequential Collation of Range (satellite, USAF)
SEM	space environment monitor
SEO	Satellite for Earth Observations (Program, India)
SEPAC	space experiments with particle accelerators
SERT	Spinning Satellite for Electric Rocket Test (NASA)
SESP	Space Experiment Support Program
SESPO	Space Environmental Support Project Office
SFA	sweep frequency analyzer
SHS	Soviet Hydrometeorological Service
SIBS	Salk Institute for Biological Studies
SIDS	Space Investigations Documentation System (NASA)
SIG	selenide isotope generator
SIM	scientific instrument module
SIRE	satellite infrared experiment
SIRS	satellite infrared spectrometer; System for Information Retrieval and Storage (NSSDC)
SM	San Marco (satellite, NASA-Italy)
SMC	scanning modulation collimator
SME	Solar Mesosphere Explorer (satellite, NASA)
SMM	Solar Maximum Mission (satellite, NASA)
SMMR	scanning multispectral microwave radiometer
SMS	Synchronous Meteorological Satellite (NASA)
S/N	signal to noise
SNAP	systems for nuclear auxiliary power
SOEP	solar-oriented experiment package
SOLRAD	Solar Radiation (satellite, NASA-DOD)
SPADES	Solar Perturbation and Atmospheric Density Measurement Satellite (DOD)
SPHINX	Space Plasma High Voltage Interactive Experiment (satellite, NASA)
SPIDPO	Shuttle Payload Integration and Development Program Office
SPM	solar proton monitor
SPOT	Système Probatoire d'Observation de la Terre
SPW	stimulated plasma waves
SQ	square
SR	Solar Radiation (satellite, NASA); scanning radiometer; sounding rocket; steradian
SRATS	Solar Radiation and Thermospheric Structure (satellite, Japan)
SRC	Space Research Council; Science Research Council

SRI	Stanford Research Institute
SRPA	spherical retarding potential analyzer
SRT	supporting research and technology
SS	Space Shuttle
SSC	Satellite Situation Center
SSCC	spin-scan cloudcover camera
SSD	Space Science Division (JPL)
SSH	spherical sensor H
SSLDEF	Space Shuttle Long-Duration Exposure Facility
SSM/T	special sensor microwave/temperature sounder
SSPP	Shuttle Spacelab Payloads Project
SSS	Small Scientific Satellite (NASA)
SST	satellite-to-satellite tracking
SSUS	solid spinning upper stage
ST	Space Telescope (satellite, NASA)
STADAN	Spacecraft Tracking and Data Acquisition Network (now STDN)
STARAD	Starfish Radiation (satellite, NASA)
STD	standard
STDN	Spaceflight Tracking and Data Network (NASA)
STL	Space Technology Laboratories (now TRW Systems Group)
STN	station
STP	Solar Terrestrial Probe (satellite, NASA); Solar Terrestrial Physics; Space Test Program
STRATOS	stratosphere
STS	Space Transportation Systems
STUD	studies
SUI	State University of Iowa (now University of Iowa)
SURCAL	Surveillance Calibration (satellite, DOD)
SUSIM	solar ultraviolet spectral irradiance monitor
SVC	service
SW	southwest
SWE	mass separating solar wind; solar wind experiment
SWRF	Sine Wave Response Filter (program)
SXR	solar X-ray flare and cosmic-ray burst investigation
SYNCOM	Synchronous Communication (satellite, NASA)
SYST	system
TAC	Technology Application Center
TACOMSAT	Tactical Communications Satellite (DOD)
TATS	Test and Training Satellite (NASA)
TATSACOM	Tactical Satellite Communications (program, DOD)
TBD	to be determined
TD	technical director; Thor-Delta (satellite, ESA); launch vehicle (NASA-USAF)
TDP	Tracking Data Processor (program)
T+DR	tracking and data relay
TDRSS	tracking and data relay satellite system
TE	electron temperature; tellurium
TEC	telemetry and command; transearth coast
TECH	technical; technology
TED	total energy detector

TEI	transearth injection
TELESAT	Canadian Telecommunications Satellite (also referred to as ANIK)
TEMP	temporal; temperature
TET	telescope and electron telescope
TETR	Test and Training (satellite, NASA)
TEV	tetra electron volts
THIR	temperature/humidity infrared radiometer
THORAD-AGE	Thor Augmented Delta Agena (launch vehicle)
TIMATION	Time Location System (USN)
TIP	Tracking Impact Prediction (satellite, DOD)
TIROS	Television and Infrared Observations Satellite (NASA)
TL	team leader
TLD	thermoluminescence detector
TLI	translunar injection
TM	team member; thematic mapper
TN	Tennessee
TOMS	total ozone mapping system
TOPO	topographic
TOPS	Thermal Noise Optical Optimization Communication System (NASA)
TOS	TIROS Operational Satellite (or System) (NASA)
TOVS	TIROS operational vertical sounder
TPS	thick plastic stack
TRAAC	Transit Research and Attitude Control (satellite, USN)
TRANET	Doppler Tracking Network (USN)
TRANSP	transportation
TRS	Tetrahedral Research Satellite (USAF)
TRUST	television relay using small terminals
TRW	Thompson, Ramo, Wooldridge (Inc.)
TS	thermal smoothed
TT	triggering telescope
TTS	Test and Training Satellite (NASA) (also called TATS, TETR)
TWERLE	tropical wind energy conversion and reference level experiment
TX	Texas
U	university; atom; mass unit
UA	unified abstract
UARS	Upper Atmosphere Research Satellite(s)
UCLA	University of California at Los Angeles
UHF	ultrahigh frequency
UK	United Kingdom
UKSRC	United Kingdom Space Research Council
ULEWAT	ultralow-energy wide-angle telescope
ULEZEQ	ultralow-energy Z, E, Q
US	United States
USA	United States Army; United States of America
USAF	United States Air Force
USB	unified s-band; upper side band
USGS	United States Geological Survey
USN	United States Navy
USSR	Union of Soviet Socialist Republics

UT	universal time; Utah
UV	ultraviolet
UVNO	ultraviolet nitric-oxide experiment
UVS	ultraviolet spectrometer
V	volt
VA	Virginia
VAE	visible airglow experiment
VAR	variation
VAS	VISSR atmospheric sounder
VCGS	vapor crystal growth system
VCO	voltage controlled oscillator
VDC	volts DC
VEFI	vector electric field instrument
VHF	very high frequency
VHRR	very high resolution radiometer
VIS	visual imaging spectrometer
VISSR	visible infrared spin-scan radiometer
VLF	very low frequency
VOIR	Venus Orbiting Imaging Radar
VT	Vermont
VTPR	vertical temperature profile radiometer
W	watt; west
WA	Washington
WATS	wind and temperature spectrometer
WBM	wide-band module
WBTVR	wide-band video tape recorder
WDC	World Data Center
WDC-A-R&S	World Data Center A for Rockets and Satellites
WEFAX	weather facsimile
WFC	Wallops Flight Center (NASA); wave form channel
WGSPR	Working Group for Space Physics Research
WI	Wisconsin
WMO	World Meteorological Organization
WPM	words per minute
WRESAT	Weapons Research Establishment Satellite (Australia)
WS	Wallops Station (NASA; now Wallops Flight Center)
WSIR	wide swath imaging radar
WSMR	White Sands Missile Range
WTR	Western Test Range (also referred to as Vandenberg AFB)
WV	West Virginia
WWW	World Weather Watch
WY	Wyoming
XRFS	X-ray fluorescence spectrometer
XRP	X-ray polychromator
XUV	extreme ultraviolet

YR

year

Z

atomic number

ZLE

zodiacal light/background starlight investigation